

Dean, Ouisha <ouisha.dean@solvay.com>

Fwd: FW: 1 message

Brown, Tim <tim.brown@solvay.com>

Tue, Sep 3, 2013 at 10:13 AM

To: Jim Phillip <Jim.Phillip@solvay.com>, David Hansen <david.hansen@solvay.com>, Ryan Schmidt <ryan.schmidt@solvay.com>, Ouisha Toenyes <ouisha.toenyes@solvay.com>

fyi

-- Forwarded message ---Date: Tue, Sep 3, 2013 at 9:46 AM

Subject: FW:

To: tim.brown@solvay.com

Cc: Rodger Steen <rgsteen@airsci.com>

Tim.

I spoke with Sam at Sinclair and he was very helpful. See attached for the Sinclair permit application - of interest are the BACT cost calculations on page 111 of the PDF for the 233 MMBtu/hr gas-heater.

I'll call you shortly to discuss this in the context of our Solvay calculations.

-Tim

From: Sam Greene [mailto:sgreene@sinclairoil.com]

Sent: Tuesday, September 03, 2013 10:08 AM

To: tmartin@airsci.com

Subject:

Sam Greene P.E.

Corporate Environmental Engineer

Sinclair Oil Corporation

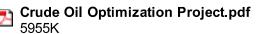
(801) 524-2729

sgreene@sinclairoil.com

CONFIDENTIALITY NOTICE - This e-mail transmission, and any documents, files or previous e-mail messages attached to it, may contain information that is confidential or legally privileged. If you are not the intended recipient, or a person responsible for delivering it to the intended recipient, you are hereby notified that you must not read this transmission and that any disclosure, copying, printing, distribution or use of any of the information contained in or attached to this transmission is STRICTLY PROHIBITED. If you have received this transmission in error, please immediately notify the sender by telephone or return e-mail and delete the original transmission and its attachments without reading or saving in any manner. Thank you.

Tim Brown **Environmental Services Supervisor** (307) 872-6570 tim.brown@solvay.com

All technical advice and recommendations provided, if any, are intended for the use by persons having the appropriate education and skill. Solvay Chemicals, Inc. and its affiliates shall not be liable for any use or non-use of such advice and/or recommendations. Users of our products are soley responsible for the design, construction and operation or their own facilities.





Certified Mail Return Receipt Requested # 7008 0500 0001 0314 2856

October 10, 2011

Mr. Chad Schlichtemeier
NSR Program Manager
Air Quality Division
Wyoming Department of Environmental Quality
Herschler Building
122 West 25th Street
Cheyenne, Wyoming 82002

Re: Sinclair Wyoming Refining Company (SWRC)
Crude Oil Optimization Project
Transmittal of Construction Permit Application

Dear Mr. Schlichtemeier:

Sinclair Wyoming Refining Company (SWRC) is planning to increase the crude oil refining capacity and implement other miscellaneous projects at its petroleum refinery located in Sinclair, Wyoming. Attached please find the construction permit application required by the Wyoming Air Quality Standards & Regulations (WAQS&R). The crude optimization project consists of:

- Removal of the 581 Crude Unit heater firing rate limit and replacement of the 581 Crude Unit atmospheric distillation tower;
- Modification of the 583 Vacuum tower to accommodate the resulting increase in reduced crude feedstock from the debottlenecked 581 Crude Unit; and
- Allowing the combustion of sweetened refinery fuel gas in the Coker Flare to accommodate potential periods when the refinery may have to operate in a fuel gas imbalance condition.

In addition, this application includes the following projects that are unrelated to the increase of crude oil refining capacity:

 Removal of the firing rate limits for the #1 IIDS heater, Naphtha Splitter heater and IIydrocracker H5 heater so that these units will able to fire at their design maximum firing rates. This change will eliminate the requirement for fuel gas flow monitor testing to demonstrate that these heaters operate at the sub-design firing rates specified in the current permit. Note that this action is being requested solely to eliminate the need for annual fuel gas flow meter testing.

- Installation of a new Naphtha Splitter and Benzene Saturation/Isomerization (BSI) Unit to provide the capability to reduce the benzene content in the refinery's gasoline product to meet the specifications of the February 2007 Mobile Source Air Toxics II (MSAT II) rule. This potential project is totally unrelated to the Crude Oil Optimization Project. Depending on SWRC's success at meeting MSAT II requirements using the current refinery configuration, SWRC may elect to forego installing a new Naphtha Splitter and/or BSI unit.
- Upgrade of the refinery's sour water stripping system which will include increasing the capacity of the existing sour water stripping system and installation of an additional sour water stripper. Sour water is a byproduct of the refining process that refers to water containing hydrogen sulfide and ammonia. A sour water stripper removes the H₂S and Ammonia gases from sour water using steam heat. The gases then go to the refinery Sulfur Recovery Plants where 99+% of the sulfur is recovered as product sulfur. The stripped water is either used in other refining processes or goes to the refinery wastewater treatment plant for processing. The installation of the new sour water stripper will improve the refinery's ability for continuous sour water stripping and is included in the project description for completeness.
- Installation of a new emergency air compressor that will supply instrument air to the refinery in the event of a power failure.

SWRC has conservatively elected to treat all of the projects described above as a single project from a New Source Review (NSR) applicability perspective. Because SWRC is located in an area that is designated as attainment with all National Ambient Air Quality Standards (NAAQS), Non-attainment New Source Review (NNSR) is not required. As described in the application, this project will trigger Prevention of Significant Deterioration (PSD) permitting requirements for the pollutants oxides of nitrogen (NO_X), carbon monoxide (CO), Volatile Organic Compounds (VOC), sulfur dioxide (SO₂), and Greenhouse Gases (GHG). Because EPA Region 8 currently has primacy over the processing of GHG permit applications for PSD sources in Wyoming, the GHG portion of the permit application is being submitted to EPA Region 8 under separate cover. This project will not trigger PSD permitting requirements for particulate matter (PM), particulate matter smaller than 10 microns (PM₁₀), or particulate matter smaller than 2.5 microns (PM_{2.5}). SWRC has also been working closely with the Federal Land Manager (FLM) to develop an approved protocol for the PSD-required analysis of Federal Class I area impacts. A copy of this application is also being provided to the FLM. The application demonstrates compliance with all PSD and WAQS&R requirements.

Please note that on June 30, 2008 SWRC entered into a Consent Decree (CD) with Wyoming and EPA (Civil Action No. 08CV 020-D). This application demonstrates that the proposed projects do not conflict with any CD provisions.

Sinchar Wyoming Reflating Company Crude Oil Optimization Project Transmittal of Construction Permit Application October 10, 2011, rev. 0

SWRC is planning to perform the activities included in this construction permit application in the 2012 timeframe. Because permit issuance is required prior to commencing actual construction, SWRC is available at any time to discuss this project and permit application with the Division. Please contact Mr. John Pfeffer, Environmental Manager, at (307) 328-3548 with any questions or comments regarding this transmittal.

Sincerely,

Jim Maguire

Refinery Manager

JM/sbg

attachment

cc;

M. Serres

ce: Electronic

J. Pfeffer

S. Greene

J. Maffuccio

Sinchir Wyaming Refining Company Crude Oil Optimization Project Transmittal of Construction Permit Application October 10, 2011, rev. 0

SINCLAIR WYOMING REFINING COMPANY CONSTRUCTION PERMIT APPLICATION CRUDE OIL OPTIMIZATION PROJECT

TABLE OF CONTENTS

1.0	Introduction 8					
1.1	Actio	ous to Optimize Crude Oil Throughput				
1.2	Elim	ination of Firing Rates on Selected Heaters	8			
1.3	New	Naphtha Splitter and/or Benzene Saturation/Isomerization Unit	8			
1.4	Sour	Water Stripper System Upgrade	9			
1.5	New	Emergency Air Compressor	9			
1,6	New Source Review Considerations1					
1.7	Cons	ent Decree Implications	10			
2.0	Pera	nit Application Forms	11			
3.0	Proc	ess Description	24			
3.1	Proi	cet Overview	24			
	3.1,1	Increased Crude Oil Throughput	24			
	3.1.2	Elimination of Firing Rate Limits on Select Heaters	25			
	3.1.3	New Naphtha Splitter and/or Benzene Saturation / Isomerization Unit (MS	$\overline{\Lambda T}$ Π			
		Project)	25			
	3.1.4	Sour Water Stripper System Upgrade	.			
	3.1.5	New Emergency Air Compressor	25			
3,2	Mod	ified Equipment	25			
	3.2.1	581 Crude Unit	26			
	3,2,2	583 Vacuum Unit	26			
	3.2.3	Coker Unit Flare	27			
	3.2.4	#1 IIDS Heater, Naphtha Splitter Heater and Hydrocracker H5 Heater	27			
	3.2.5	Naphtha Splitter (MSAT II)	28			
	3.2.6	#1 Sour Water Stripper (#1SWS) and #2 Sour Water Stripper (#2SWS)	28			
3.3		Equipment	29			
	3.3.1		29			
	3.3.2		29			
		,2,1 BSI Unit (MSAT II)	29			
		.2,2 BSI Product Tank (MSAT II)	30			
		.2.3 Fugitive Emission Components (MSAT II)	30			
	3.3.3	.2.2 BSI Product Tank (MSAT II) .2.3 Fugitive Emission Components (MSAT II) #3 Sour Water Stripper (3#SWS)	30			
	3.3.4	New Emergency Air Compressor	31			
3.4	Non-	Modified Equipment	31			
	3.4.1	#1 and #2 Hydrogen Plants	31			
	3.4.2	#1 IIDS	32			
	3.4.3	Light Ends Fractionator (LEF)	32			

	3.4.4	781 Reformer	32
	3.4.5	#2 HDS	33
	3.4.6	#3 HDS	33
	3.4.7	#4 UDS	33
	3.4.8	Fluid Catalytic Cracking Unit (FCCU)	33
	3.4.9	Hydrocracker Unit (HCU)	33
	3.4.10	Gas Recovery Unit (GRU)	33
	3.4.11	Saturate Gas Recovery Unit (SGRU)	34
	3.4.12	Poly Plant	34
	3.4.13	Alky Unit	34
	3.4.14	Coker Unit	-34
	3.4.15	Sulfur Recovery Plants (SRPs)	34
	3,4,16	Light Oil Loading Rack (LOLK)	33
	3.4.17		35
	3.4.18	Pressure Vessels	35
	3.4.19	Asphalt Plant	35
3.5	Unaff	ected Units	35
	3.5.1	582 Crode Unit / 582 Vacuum Unit	35
	3.5.2	Beilerhouse	35
	3.5.3	Flarc Gas Recovery (FGR) System	36
	3,5,4	Oily Water Treatment System	36
	3.5.5	Cooling Towers	36
4.0	Permi	t Limitations	38
1.1		ated Emissions	38
•••	4.1.1	New Sources	38
		Modified Sources	38
	4.1.3	Non-Modified Sources	39
1.2	·	***************************************	40
1.4		ions Calculation Basis SO ₂ Emissions	40
		MO. Umissions	42
		DARGOAR COME Novice Come	44
	4.2.4		44
	4.2.5	CO Emissions VOC Emissions	46
5.0		S&R Chapter 6: Permitting Requirements	48
			70
5.1		S&R Chapter 6, Section 2: Permit requirements for construction, ication, and operation	48
	5.1.1	WAQS&R Chapter 6, Section 2(c)(i): (Compliance with Applicable Rules &	
	-	Regulations)	48
	5.1.2	WAQS&R Chapter 6, Section 2(e)(ii): (Attainment / Maintenance of Ambient	_
		Air Quality Requirements	48
	Class I ar	nd Class II Area Significant Impact Analyses	49

	Class I a	and II Area Cumulative Impact Analyses	_ 50		
	WDEQ-	AQD Inhalation Risk Assessment	50		
	5.1.3	WAQS&R Chapter 6, Section 2(c)(iii): (Significant Deterioration of Existing	-		
	21 d	Ambient Air)	_ 51		
		Analysis	51		
	Soils an	d Vegetation Analysis	. 51		
Cla		Impacts - Air Quality Related Values	_ 51		
	5.1.4	WAQS&R Chapter 6, Section 2(c)(iv): (Location Standards)	52		
	5.1.5	• • • • • • • • • • • • • • • • • • • •			
		(BACT) Evaluation)	_ 52		
		5.1 SO ₂ Emissions	_ 54		
		5.2 CO Emissions	_ 54		
		5.3 VOC Emissions	. 55		
	5.1.	5.4 NO _X Emissions	57		
		5.1.5.4.1 New and Modified Heaters NO _x Control Cost Analysis	_ 58		
	5.1.6	WAQS&R Chapter 6, Section 2(c)(vi): (Measurement of Emissions)	62		
	5.1.7	WAQS&R Chapter 6, Section 2(c)(vii): (Achievement of Performance Specif			
		in Permit Application)	62		
	5.1.8	WAQS&R Chapter 6, Section 2(e)(viii): (Ambient Air Quality Standard Impa			
		on Surrounding States)	62		
5.2	WAQ	S&R Chapter 6, Section 2(d): Use of Dispersion Techniques	62		
5.3	WAQS&R Chapter 6, Section 3: Operating Permits63				
5.4	WAQS&R Chapter 6, Section 4: Prevention of Significant Deterioration6				
5.5	-	S&R Chapter 6, Section 5: Permit Requirements for Construction and fication of NESHAP Sources	65		
6.0	New	Source Performance Standards: WAQS&R Chapter 5, Section 2	66		
6.1	New !	Source Performance Standards Applicable to this Project	66		
	6.1.1	WAQS&R Chapter 5, Section 2 - 40 CFR 60, Subpart Kb: Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction or Modification Commenced After July 23, 1984			
	6.1.2	WAQS&R Chapter 5, Section 2 – 40 CFR 60, Subpart Ja: Standards of	. ~~		
	0.2.2	Performance for Petroleum Refineries	67		
	6.1.3	WAQS&R Chapter 5, Section 2 40 CFR 60 Subpart IIII: Standards of			
		Performance for Stationary Compression Ignition Internal Combustion Engine	s 67		
	6.1.4	WAQS&R Chapter 5, Section 2 - 40 CFR 60, Subpart GGGa: Standards of			
		Performance for Equipment Leaks of VOC in Petroleum Refineries for which	,		
		Construction, Reconstruction, or Modification Commenced After November 7 2006	, 67		
		/4081	111		

	6.1.3	Performance for VOC Emissions from Petroleum Refinery Wastewater System	18 6
6.2	New	Source Performance Standards Not Applicable to this Project	6
•	6.2.1	WAQS&R Chapter 5, Section 2 - 40 CFR 60 Subpart Dc; Standards of	
		Performance for Small Industrial-Commercial-Institutional Steam Generating Units	6
	6.2.2	WAQS&R Chapter 5, Section 2 – 40 CI'R 60 Subpart Db: Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units	6
	6.2.3	WAQS&R Chapter 5, Section 2 40 CFR 60 Subpart J: Standards of Performance for Petroleum Refineries and 40 CFR 60 Subpart Ja: Standards of Performance for Petroleum Refineries	r 6
	6.2.4	WAQS&R Chapter 5, Section 2 – 40 CFR 60 Subpart I: Standards of Performance for Hot Mix Asphalt Facilities	6
	6.2.5	WAQS&R Chapter 5, Section 2 - 40 CFR 60 Subpart GG: Standards of Performance for Stationary Gas Turbines	6
	6.2.6	WAQS&R Chapter 5, Section 2 – 40 CFR 60 Subpart UU: Standards of Performance for Asphalt Processing and Asphalt Roofing Manufacture	6
	6.2.7	WAQS&R Chapter 5, Section 2 - 40 CFR 60 Subpart XX: Standards of Performance for Bulk Gasoline Terminals	6
	6.2.8	WAQS&R Chapter 5, Section 2 – 40 CFR 60 Subpart III: Standards of Performance for Volatile Organic Compound (VOC) Emissions From the Synthetic Organic Chemical Manufacturing Industry (SOCMI Air Oxidization Processes)	
	6.2.9	WAQS&R Chapter 5, Section 2 – 40 CFR 60 Subpart KKK: Standards of Performance for Equipment Leaks of VOC From Onshore Natural Gas Process Plants	in, 6
	6.2.10	WAQS&R Chapter 5, Section 2 – 40 CFR 60 Subpart LLL: Standards of Performance for Onshore Natural Gas Processing: SO ₂ Emissions	6
	6.2.11	WAQS&R Chapter 5, Section 2 - 40 CFR 60 Subpart NNN: Standards of Performance for Volatile Organic Compound (VOC) Emissions From the Synthetic Organic Chemical Manufacturing Industry (SOCMI) Distillation Operations	G
	6.2.12	WAQS&R Chapter 5, Section 2 - 40 CFR 60 Subpart RRR: Standards of Performance for Volatile Organic Compound Emissions From the Synthetic Organic Chemical Manufacturing Industry (SOCMI) Reactor Processes	7
	6.2.13	WAQS&R Chapter 5, Section 2 – 40 CFR 60.18(b): General Control Device Requirements (Flares)	70
	6.2.14	WAQS&R Chapter 5, Section 2 – 40 CFR 60, Subpart GGG: Standards of Performance for Equipment Leaks of VOC in Petroleum Refineries	70

7.0	40 CI	FR 61 (NESHAP)	7
7.1	NESI 7.1.1 7.1.2	HAP Standards Applicable to this Project	7
		Operations (BWON)	7
7.2	NESI	HAP Standards Not Applicable to this Project	7
	7.2.1	40 CFR 61 Subpart J: National Emission Standards for Equipment Leaks (Fugitive Emission Sources) of Benzene	7
	7.2.2	40 CFR 61 Subpart V: National Emission Standards for Equipment Leaks (Fugitive Emission Sources)	7
	7.2.3	40 CFR 61 Subpart Y: National Emission Standards for Benzene Emissions for Benzene Storage Vessels	or 7
	7.2.4	40 CFR 61 Subpart BB: National Emission Standards for Benzene Emissions from Benzene Transfer Operations	7
8.0	40 CI	FR 63 (MACT) WAQS&R Chapter 5, Section 3	7
8.1	MAC	Yr Standards Applicable to this Project	7
	8.1.1	40 CFR 63 Subpart DDDDD - National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers and Process Heaters	7
	8.1.2	WAQS&R Chapter 5, Section 3 - 40 CFR 63 Subpart CC - National Emission Standards for Hazardous Air Pollutants From Petroleum Refineries	7
	8.1.3	WAQS&R Chapter 5, Section 3 – 40 CFR 63 Subpart 7.7.7.7 National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines	
	8.1.4	WAQS&R Chapter 5, Section 3 40 CFR 63 Subpart GGGGG - National Emission Standards for Hazardous Air Pollutants: Site Remediation	7
8.2	MAC	T Standards Not Applicable to this Project	7
	8.2.1	WAQS&R Chapter 5, Section 3 - 40 CFR 63 Subpart F - National Emission Standards for Organic Hazardous Air Pollutants From the Synthetic Organic Chemical Manufacturing Industry	7
	8.2.2	WAQS&R Chapter 5, Section 3 – 40 CFR 63 Subpart G - National Emission Standards for Organic Hazardous Air Pollutants From the Synthetic Organic Chemical Manufacturing Industry for Process Vents, Storage Vessels, Transfer Operations, and Wastewater	
	8.2.3	WAQS&R Chapter 5, Section 3 – 40 CFR 63 Subpart H - National Emission	•
	_	Standards for Organic Hazardous Air Pollutants for Equipment Leaks	7
	8,2.4	WAQS&R Chapter 5, Section 3 – 40 CFR 63 Subpart Q - National Emission Standards for Hazardous Air Pollutants for Industrial Process Cooling Towers	7
	8.2.5	WAQS&R Chapter 5, Section 3 40 CFR 63 Subpart R - National Emission Standards for Gasoline Distribution Facilities (Bulk Gasoline Terminals and	
		Pineline Breakout Stations)	7

	8.2.6	40 CFR 63 Subpart LLLLL - National Emission Standards for Hazardous Air Pollutants: Asphalt Processing and Asphalt Roofing Manufacturing	74
	8.2.7	WAQS&R Chapter 5, Section 3 40 CFR 63 Subpart UUU - National Emission	
		Standards for Hazardous Air Pollutants for Petroleum Refineries: Catalytic	7.1
	8.2.8	Cracking Units, Catalytic Reforming Units, and Sulfur Recovery Units	
		Standards for Hazardous Air Pollutants: Organic Liquids Distribution (Non-Gasoline)	74
9.0		R 64 - Compliance Assurance Monitoring (CAM) for Major Stationary	74
10.0		R 68 - Chemical Accident Prevention Provisions	
11.0	40 CF	R 82 – Protection of Stratospheric Ozone	74
LIS.	r of ta	BLES	
Tabl	ic 4.1 Pot	ential to Emit – New Sources	38
		ential to Emit – Modified Sources	
		ential to Emit – Non-Modified Sources	
		nmary of Cost Effectiveness for SCR Alternative - 581 Crude Unit Heater	
Tabl	le 5.2 Sus	nmary of Cost Effectiveness for SCR Alternative - 583 Vacuum Heater	60
Tab!	le 5.3 Sur	nmary of Cost Effectiveness for SCR Alternative – #1 HDS Heater	60
Tabl	le 5.4 Sun	umary of Cost Effectiveness for SCR Alternative – Naphtha Splitter Heater	60
Tabi	le 5.5 Sun	amary of Cost Effectiveness for SCR Alternative – Hydrocracker H5 Heate	
Tabl	le 5.6 Sun	nmary of Cost Effectiveness for SCR Alternative – New BSI Heater	
Tabl	e 5.7 Pro	ject Emissions and PSD Significance Test	63
Tabl	e 5.8 Pro	ject Emissions and PSD Significance Netting Analysis	65
LIST	r of fig	<u>ures</u>	
Figu	re 2.1 Re	finery Process Flow Diagram	21
		finery Plot Pian	22
		linery Location Prawing	23

Sinclair Wyoming Relining Company Crude Oil Optimization Project Transmittal of Construction Permit Application October 10, 2011, rev. 0

LIST OF APPENDICES

Appendix A - SO ₂ Emission Calculations	A-1
Appendix B - NO _X Emission Calculations	В-1
Appendix C – PM/PM ₁₀ /PM _{2.5} Emission Calculations	C-1
Appendix D - CO Emission Calculations	D-1
Appendix E - VOC Emission Calculations	E-1
Appendix F - Fugitive Emission Calculations	F-1
Appendix G - HAP Emission Calculations	G-1
Appendix H PSD Netting Emissions	H-1
Appendix Ia through If— New and Modified Heater - SCR Cost Analysis	I-1a
Annendix J - Detailed Ambient Air Quality Modeling Analysis	

Stachar Wyoming Retining Company Crude Oil Optimization Project Transmittal of Construction Permit Application October 10, 2011, rey, 0

1.0 Introduction

Sinclair Wyoming Refining Company (SWRC) is proposing to increase the crude oil refining capacity at its petroleum refinery in Sinclair, Wyoming. In addition, this application includes miscellaneous projects that are unrelated to the increase of crude oil refining capacity. This construction permit application is intended to satisfy all construction permit requirements in the Wyoming Air Quality Standards and Regulations (WAQS&R).

The refinery has submitted a complete Title V operating permit renewal application and is currently operating under the operating permit shield provisions in the WAQS&R. This application addresses the appropriate portions of SWRC's Operating Permit # 30-145 which has expired but is administratively continued. The refinery is also operating under the provisions of other various construction permits/waivers issued after submittal of the operating permit renewal application.

1.1 Actions to Optimize Crude Oil Throughput

The Crude Oil Optimization Project consists of:

- Removal of the 581 Crude Unit heater firing rate limit and replacement of the 581 Crude Unit atmospheric distillation tower;
- Modification of the 583 Vacuum tower to accommodate the resulting increase in reduced crude feedstock from the debottlenecked 581 Crude Unit; and,
- Allowing the combustion of sweetened refinery fuel gas (i.e. meeting the NSPS Subpart Ja II2S standards) in the Coker Flare to accommodate potential periods when the refinery may have to operate in a fuel gas imbalance condition.

1.2 Elimination of Firing Rates on Selected Heaters

In a project that is unrelated to the actions to expand crude processing capacity, SWRC is proposing to remove the firing rate limits on the #1 IIDS heater, Naphtha Splitter Heater and Hydrocracker H5 heater so that these units will able to fire at their design maximum firing rates. This change will eliminate the requirement for fuel gas flow monitor testing to demonstrate that these heaters operate at the sub-design firing rates specified in the current permit. Note that this action is being requested solely to eliminate the need for annual fuel gas flow meter testing.

1.3 New Naphtha Splitter and/or Benzene Saturation/Isomerization Unit

SWRC is proposing to install a new Naphtha Splitter and Benzene Saturation/Isomerization (BSI) Unit to provide the capability to reduce the benzene content in the refinery's gasoline product to meet the specifications of the February 2007

Sinclair Wyoming Refining Company Crude Oil Optimization Project Transmittal of Construction Permit Application October 10, 2011, rev. 0

Mobile Source Air Toxics II (MSAT II) rule. This potential project is totally unrelated to the actions to expand crude oil refining capacity. Depending on SWRC's success at meeting MSAT II requirements using the current refinery configuration, SWRC may elect to forego installing a new Naphtha Splitter and/or BSI unit.

1.4 Sour Water Stripper System Upgrade

Sour water is a byproduct of the refining process that refers to water containing hydrogen sulfide and ammonia. A sour water stripper removes the H₂S and Ammonia gases from sour water using steam heat. The gases then go to the refinery Sulfur Recovery Plants where 99+% of the sulfur is recovered as product sulfur. The stripped water is either used in other refining processes or goes to the refinery wastewater treatment plant for processing.

In order to upgrade of the refinery's sour water stripping system, SWRC is proposing to increase the capacity of the existing sour water stripping system and install a new sour water stripper. The new sour water stripper will provide the capability to treat sour water during periods of downtime for the current sour water stripper system. The sour water stripper system upgrade will improve the refinery's ability for continuous sour water stripping and is included in the project description for completeness.

1.5 New Emergency Air Compressor

A new emergency air compressor will be installed to supplement the existing emergency air supply system. The emergency air compressor system supplies instrument air to the refinery in the event of a power failure.

1.6 New Source Review Considerations

SWRC has conservatively elected to treat all of the projects described above as a single project from a New Source Review (NSR) applicability perspective. Because SWRC is located in an area that is designated as attainment with all National Ambient Air Quality Standards (NAAQS), Non-attainment New Source Review (NNSR) is not required. As described in the application, this project will trigger Prevention of Significant Deterioration (PSD) permitting requirements for the pollutants oxides of nitrogen (NO_X), carbon monoxide (CO), Volatile Organic Compounds (VOC), sulfur dioxide (SO₂), and Greenhouse Gases (GHG). Because EPA Region 8 currently has primacy over the processing of GHG permit applications for PSD sources in Wyoming, the GHG portion of the permit application is being submitted to EPA Region 8 under separate cover. This project will not trigger PSD permitting requirements for particulate matter (PM), particulate matter smaller than 10 microns (PM₁₀), or particulate matter smaller than 2.5 microns (PM2.5). SWRC has also been working closely with the Federal Land Manager (FLM) to develop an approved protocol for the PSD-required analysis of Federal Class I area impacts. A copy of this application is also being provided to the FLM. The application demonstrates compliance with all PSD and WAQS&R requirements.

1.7 Consent Decree Implications

Please note that on June 30, 2008 SWRC entered into a Consent Decree (CD) with Wyoming and EPA (Civil Action No. 08CV 020-D). The application demonstrates that the proposed projects do not conflict with any CD provisions.

Sinclair Wyoming Refining Company Crude Oil Optimization Project Transmittal of Construction Permit Application October 10, 2011, rev. 0

2.0 Permit Application Forms



DEPARTMENT OF ENVIRONMENTAL QUALITY AIR QUALITY DIVISION

PERMIT APPLICATION FORM

	1	Date of Application: 10/10/11
1. Name of Firm or Institution	Sinclair Wyoming R	tefining Company
2. Mailing Address		
P. O. Box 277	Sinclair	Wyoming
Number Street	City	State
Carbon	82334	(307) 324-3404
County	Zip	Telephone
3. Plant Location		
100 East Lincoln Highway	Sinclair	Wyoming
Number Street	City	State
Carbon	82334	(307) 324-3404
County	Zip	Telephone
4. Name of owner or company o	official to contact regar	ding air pollution matters:
Jim Maguire	Refinery Manager	(307) 324-3404
Name	Title	Telephone
P. O. Box 277	Sinclair	Wyoming 82334
Number Street	City	State Zip
5. General nature of business	Refining crude oil, S	IC # 2911, NAICS # 324110

6. 7.	Reloc Non-I	cation Routine Mair	ruction X Modification orary Operation blacement I, or relocated. (List each <u>major</u>		
piec	e of equipm Modified	ent separatel Units	y.)		
1		perating Unit		Emission Source	
		d Crude Unit		S81 Crude Unit fleater	
583 Vacuum Unit				83 Vacuum Unit Heater	
ı		Flare		Coker Unit Flare	
		## HDS		#1 HDS Heater	
į	Na	phtha Splitter	N	éaphtha Splitter Heater	
ļ	ffyd	roeracker Unit		H5 Heater	
		#18WS		#I TGTU	
		#2 SWS		#3 TGTU / #4 TGTU	
	New Units				
	Oi	perating Unit		Entission Source	
BSI			BSI Heater		
Tank Facm				EQQ M bbl tank	
		id Modlfied Unit	New Fugitive Emission Sources		
	1	Doilerhouse	New Emergency Air Compressor		
#3 SWS			#3 TQTU / #4 TGTU		
		•	nd new location: le	n existing source in a new location	
INCM I	SCHUDA:	Not Appaeau	<u> </u>		
9.	If applies boxes)	tion is being	g made for a crushing u	nit, is there: (mark all appropriate	
Prim	ary Crushin	ıg	Control Equipment:	Not Applicable	
Secon	idary Crash	ting	Control Equipment:	Not Applicable	
Terti	ary Crushin	ıg	Control Equipment:	Not Applicable	
Reen	ushing & Sc	reening	Control Equipment:	Not Applicable	
Conv	eying		Control Equipment:	Not Applicable	
Dryit			Control Equipment:	Not Applicable	
*			ontrol Equipment: Not Applicable		

Proposed	dates	of operation	(month/year)	Not Applicable	

10. Materials used in unit or process (include solid fuels):

The following is a list of feedstocks and estimated charge rates to modified sources and new sources:

Modified Units

Operating Unit	Emission Source	Material Charged	Average Charge Rate (nomina
581 Crude Unit	581 Crude Unil Heater	Crude Oils	Apprex. 55,060 BPD
583 Vacuum Unit	583 Vacuum Unit Heater	Reduced Crude	Арргох. 30,000 ВРО
Finre	Coker Unit Flare	Refinery Fuel Gas / Purchased Natural Gas	Variable
#1 1108	#1 HDS Heater	Naphthas	Approx. 20,000 BPD
Naphtha Splitter	Naphtha Splitter Heater	Hydrotreated Naphthas	Approx. 20,000 BPD
Hydrocracker Buit	H5 Heater	V-10 Fractionator Bottoms (Kerosene, Diesel and heavier range hydrocarbons)	Арџгох. 18,969 БРП
#1 SWS	#I TOTU Process Vent	Sour Water	Approx. 200 gpm
#2 SWS	#3 TGTU / #4 TGTU Process Vents	Sour Water	Арргох. 200 драв

New Units

Operating Unit	Emission Source	Material Charged	Average Charge Rate (nominal)
BSI	BSI Heater	Light Straight Run	Арргох, 20,900 ВГО
Tank Form	160 M bbl fank	Gasolines	Approx. 20,000 BPD
Rofterhouse	New Entergency Air Compressor	Air	Approximately 1680 efm (discharge conditions)
#3 SW8	#3 / #4 TGTU Process Vents	Sour Water	Арргох. 200 дры

11. Air contaminants emitted:

SO2, NOx, PM, CO, VOC, HAP (see Appendices)

12. Air contaminant control equipment:

Emission Point	Туре	Pollutant Reduces	Efficiency
581 Crude Unit Bester	Ultra-Low NOx Burners	NOx	≤ 0.030 8b NO _N / NSM Btn (EHIV)
583 Vacuum Unit Heater	Uitra-Low NOx Burners	NO_X	≤ 0.030 lb NO _X / MM Bin (HIIV)
Coker Unit Flare	None	N/A	N/A
## HDS Heater	Ultra-Low NOx Burners	NO _X	≤ 0.035 ib NO _x / MM Btn (HHV)
Naphtha Splitter Heater	Ultra-Low NOx Burners	NO _X	≤ 0.035 ib NO _X / MM Btn (HHV)
H 5 Heater	Ultra-Low NOx Burners	NOX	≤ 0.035 lb NO _X / MM Btn (HHV)
BSI Heater	Ultra-Low NOx Burners	NO_X	\leq 0.030 lb NO _X / MM Btn (HHV)
F00 M bbl tank	External Floating Roof	УОС/ПАР	N/A
New Emergency Air Compressor	N/A	NOx, PM, CO	Meets NSPS Tier III Performance Standards
#1 SWS	Claus SRU / TGTB	802	≤ 250 ppmyd SO2 (dry 0% O2)
#2 SWS	Claus SRU / TGTU	SO2	≤250 ppmyd SO2 (dry 0% O2)
#3 SWS	Claus SRU / TGTU	SO2	≤ 256 ppmvd SO2 (dry 0% O2)

1	-	•	'	£	L 2		
ı	3	1. 1	vne a	t enm	niktun	41911T:	(check if applicable):
-	_		, , , , , ,		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	*****	TUREEK II REDERCHERCH

A. Coal Not Applicable
1. Pulverized:
General; Dry Bottom; Wet Bottom; With Flyash Reinjection; Without Flyash Reinjection; Other
2. Spreader Stoker:
With Flyash Reinjection; Without Flyash Reinjection; Cyclone; Hand-Fired; Other
B. Fuel Oil <u>Not Applicable</u>
Horizontally Fired Tangentially Fired
C. Refinery Fuel Gas X Natural Gas X
D. If other, please specify <u>Not Applicable</u>
Hourly fuel consumption (estimate for new equipment) See Below .
Size of combustion unit BTU heat input/hour See below for new equipment.

Operating Unit	Emission Source	Estimated fuel consumption (Mscf/d @ 1160 Btu/SCF) (HHV)	Size of combustion unit (MM Btu/hr, HIIV)
581 Crude Unit	581 Crude Unit Heater	4,820	233,4)
583 Vacuum Unit	583 Vacuum Unit Heater	1,330	64.2
Flare	Coker Unit Flare	2,670	0.001
#1 HDS	#f HDS Heater	690	33.4
Naphtha Splitter	Naphtha Splitter Heater	960	46.3
Hydroergeker Unit	115 Heater	930	44.9
BSI	BSI Heater	1,030	59.0

14.	Operating Schedule all but New Emergency Air Compressor: 24 hours/day; 7 days/week; 52 weeks/year. Peak production season (if any): Not Applicable					
	Operating Schedule New Emergency Air compressor: <u>500</u> hours/year. Peak production season _(if say) : <u>Not Applicable</u>					
15.	Fuel analysis:					

Operating Unit	Emission Source	Btu Value (HRV)	Sulfur Context (relinery fuel gas / purchased natural gas)
581 Crude Unit	581 Crude Unit Heater	1,160 Btu/sef (typical)	≤ 162 ppmy 1128 (3 hour rolling average) and ≤ 60 ppmy H28 (365 day rolling average)
583 Vacuum Unit	583 Vacuum Unit Heater	1,160 Btu/sef (typical)	≤ 162 ppmv H2S (3 hour rolling average) and ≤ 60 ppmv H2S (365 day rolling average)
Flare	Coker Unit Flare	£,160 Btu/sef (typical)	≤ 162 ppmv H2S (3 hour rolling average) and ≤ 60 ppmv H2S (365 day rolling average)
#t HDS	#1 HDS Heater	t,160 Btu/sef (typical)	≤ 162 ppmv H2S (3 hour rolling average) and ≤ 60 ppmv H2S (365 day rolling average)
Naphtha Splitter	Naphtha Splitter Heater	1,160 Btu/sef (typical)	≤ 162 ppmv H2S (3 hear reiling average) and ≤ 60 ppmv H2S (365 day rolling average)
Hydrocravker Unit	H5 Heater	1,160 Btu/sef (typical)	≤ 162 ppmy 1128 (3 hour rolling average) and ≤ 60 ppmy H2S (365 day rolling average)
BSI	BSI Heater	L,166 Bio/sef (typical)	≤ 162 ppmv H2S (3 hour rolling average) and ≤ 60 ppmv H2S (365 day rolling average)

Operating Unit	Emission Source	Bin Value (HHV)	Sulfur Content (diesel fuel)
Bollerhouse	New Emergency Air Compressor	130,000 Bto/gal (typical of diesel fuel)	< 500 ppmw Salfar

16. Products of process or unit:

The following is a list of products, intermediates and estimated process / production rates from modified sources and new sources:

Modified Units

Operating Unit	Operating Unit Emission Source		Estimated Average Process / Production Rate (nominal)
581 Crude Unit	581 Crude Unit Heater	Fractionated Crude Oils	Approx. 55,600 BPD
583 Vacuum Unit	583 Yacuum Unit Henter	Light Vacuum Gasoil, Heavy Vacuum Gasoil, Vacuum Dõttoms	Approx. 20,000 BPD
Flare	Coker Unit Flare	N/A	N/A
#1 HDS	#1 HDS Heater	Hydrotreated Naphthas	Apprex. 15,000 BPD
Naphtha Splitter	Naphtha Splitter Heater	Light Straight Run, Naphtha, C3/C4 overheads	Apprex. 20,000 BPD
Hydrocracker Unit	H5 Heater	V-10 Fractionator Bottoms (Kerosene, Diesel and heavier range hydrocarbons)	Approx. 18,000 BPD
#1 SWS	#1 TCTU Process Vent	Stripped Sour Water	Арргох. 200 црві
#2 SWS	#3 TGTU / #4 TGTU Process Vents	Stripped Sour Water	Анргох. 200 дрт

New Units

Operating Unit	Emission Source	Material Processed / Produced	Estimated Average Process / Production Rate (nominal)
BSI	BSI Heater	Light / Henvy Benfree Product	Approx. 26,000 BPD
Tank Farm	100 M bbl tank	Casolines	Approx. 20,000 BPD
Boilerhouse	New Emergency Air Compressor	Air	Approximately 1000 cfm
#3 SWS	#3 / #4 TCTO Process Vents	Stripped Sour Water	Approx, 200 gpm

Sinclair Wyoming Refining Company Crude Oil Optimization Project Transmittal of Construction Permit Application October 10, 2011, rev. 0

17.	Emissions to the atmosphere (each point of emission should be listed separa	tely
	and numbered so that it can be located on the flow sheet): See Figure 2.2	_

18.	Does the input material or product from this process or unit contain finely divided
	materials which could become airborne?

____ Yes _____X_ No

Is this material stored in piles or in some other way as to make possible the creation of dust problems?

___Yes

X No

List storage pile (if may): Not Applicable

Type of Material	Particle Size (Diameter or Screen Size)	Pile Size (Average Tons on Pilo)	Pile Wetted (Yes or No)	Pile Covered (Yes or No)
Not Applicable	1111	· · · · · · · · · · · · · · · · · · ·		· · · · · · · · · · · · · · · · · · ·

- 19. Using a flow diagram:
 - (1) Illustrate input of raw materials.
 - (2) Label production processes, process fuel combustion, process equipment, and air pollution control equipment.
 - (3) Illustrate locations of air contaminant release so that emission points under items 11, 12 and 17 can be identified. For refineries show normal pressure relief and venting systems. Attach extra pages as needed.

See Figure 2.1 Refinery Process Flow Diagram

20. A site map should be included indicating the layout of facility at the site. All buildings, pieces of equipment, roads, pits, rivers and other such items should be shown on the layout.

See Figure 2.2 Refinery Plot Plan

 A location drawing should be included indicating location of the facility with respect to prominent highways, cities, towns, or other facilities (include UTM coordinates).

See Figure 2.3 Refinery Location Drawing

Sinclair Wyoming Refining Company Crude Oil Optimization Project Transmittal of Construction Permit Application October 10, 2011, rev. 0

"I certify to the accuracy of the plans, specifications, and supplementary data submitted with this application. It is my Opinion that any new equipment installed in accordance with these submitted plans and operated in accordance with the manufacturer's recommendations will meet emission limitations specified in the Wyoming Air Quality Standards and Regulations."					
Signature Manuel		Typed Name	Jim Maguire		
Title Refinery Manager	Сотрину		roming Refining Con	spany	
Mailing Address P. O. Box 277		Telephone No.	(307) 324-3404		
City Sinclair	State	Wyoming	Zip	82334	
P.E. Registration (if applicable)	N/A				
State where registered	N/A				

STATE OF WYOMING

Department of Environmental Quality - Air Quality Division

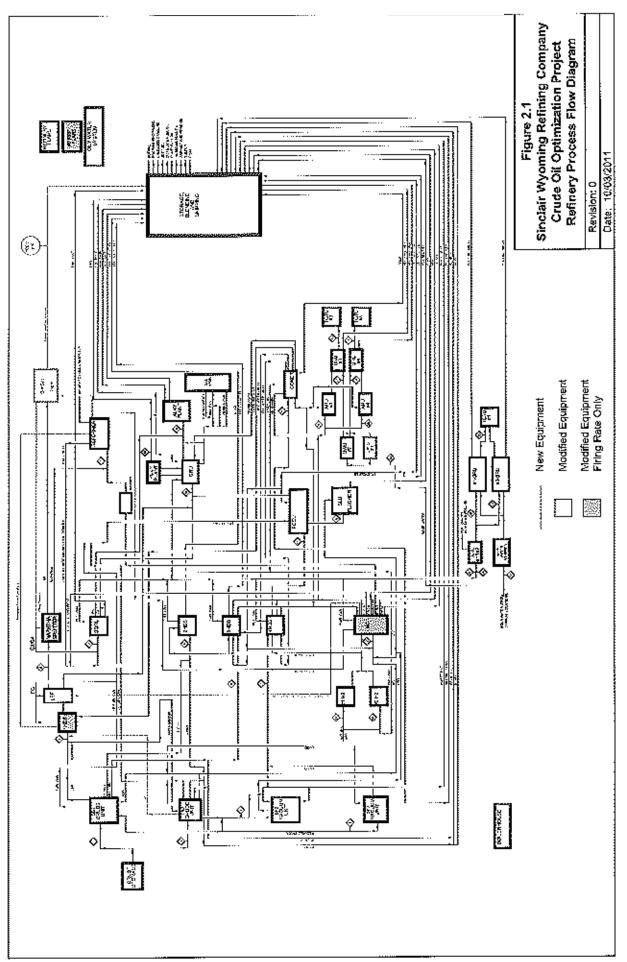
Permit Application

Reciprocating Engine Form

GENERAL INFORMATION						
Company Name: Sinclair Wyoming Refining Company						
Facility Name: Sinclair Wyo	ming Refining Co	ompany, New En	nergency Com	pressor		
		<u>EN</u>	GINE DATA			
Manufacturer: <u>Cummir</u>	ns Engine Co. I	nc	Туре of Engine:			
Madel;	TBD		4 Stroke	c Cycle: X	2 Stroke	Cycle:
No. of Cylinders: 6	(est.)					
Compression Ratio: 14,5:1	(est.)		Fuel Data:			
Serial Number:	TBD		Coal Bed N	Methane N/A	<u> </u>	Other: X Diesel
Date Ordered: 2011	(est.)		Engine Puel Puel Gas Heating Value			ne Value
	(est.)		ł .	nsumption U/bhp-hr): N/A		BTU/scf) N/A
			(117	fb/hr (i	max,est.)
<u>Nameplate</u>	Site Rat	ing	Operating	Range		
Horsepower: 400(est.) 400 (est.) 320-400 (typ,est)						
Specd (грв); 2100(cst.	Specd (rpm): 2100(cst.) 2100(cst.) 1400-2100(typ,cst)					
Exhaust Stack Height (m)	; <u>2,1</u>	Diameter (m):	. <u>0.13</u> To	emp. (K):	690 Velocity	y(m/s):100
Note:	Stuck persess	elers are estimated				
	i	EMISSIC	ONS DATA			
NO _x + NMHC (Note: 1)	CO (N	lote: 1)	VOC (Note: 2) IICHO (Note: 3		Note: 3)	
g/kp-hr lb/hr	g/hp-lar	lb/lar	g/hp-ler	ib/ac	g/hp-hr	lb/hr
3.0 2.6	,		1.0	0.88	0.00375	0.0033
Note 1 Emission factors 40 CFR Note 2: Assume HC emission fac			Ser Lengines.			
Note 2: Assume HC emission factor from 40 CFR Part 89.112 for Tier Lengines. Note 3: Emission factor per memo from Alpha-Gamma Technologies, Inc. to Sims Roy, EPA OAQPS ESD Combustion Group. Subject:						
Finissions Data for Reciprocating Internal Combustion Engines, 2/4/02.						
Annual Operating Hours: 500						
EMISSION CONTROL EQUIPMENT						
Lean Burn; X NSCR Catalyst: N/A AFR controller: X SCR Catalyst: N/A						
Oxidation Catalyst: N/A Other: N/A Describe: N/A						
Best Available Control Technology control cost analysis attached: yesno X						
ADDITIONAL INFORMATION REQUIRED						
On separate sheets of paper, attach a copy of engine manufacturer's site rating, site emission estimates, general rating specification for engine model, and documentation of date of order and date of manufacture for each engine.						

Sinclair Wyoming Refining Company Crude Oil Optimization Project Transmittal of Construction Permit Application October 10, 2011, rev. 0

Figure 2.1 Refinery Process Flow Diagram



Sinclair Wyoming Refuring Company Crade Oil Optimization Project Transmittal of Construction Pennii Application October 10, 2011, rev. 0

Figure 2.2 Refinery Plot Plan

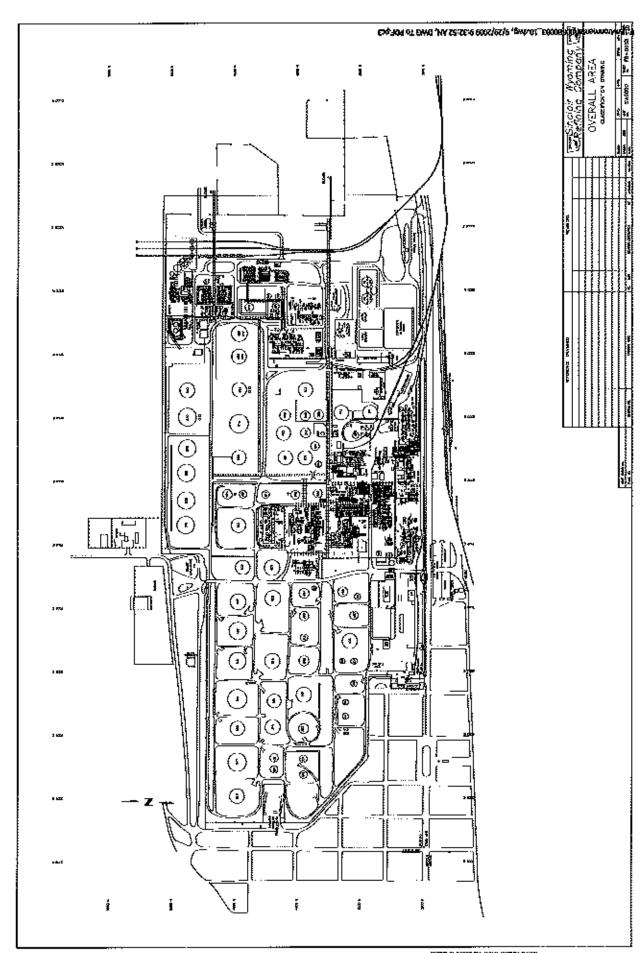
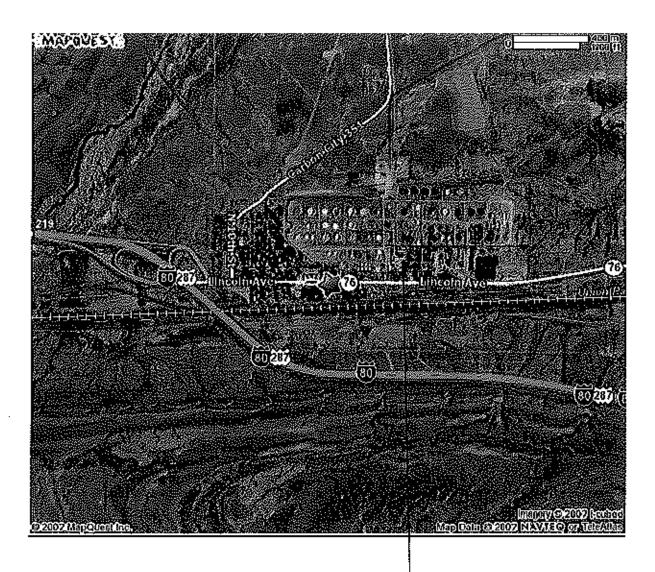


Figure 2.3 Refinery Location Drawing



Sinclair Wyoming Refining Company

3.0 Process Description

3.1 Project Overview

This permit application is comprised of the projects as described below. The overall refinery process flow and major equipment orientation is provided in the process flow diagram (Figure 2.1). In this figure, the new equipment is shown in red highlight and the modified equipment is shown in yellow and green highlight. The plot plan (Figure 2.2) indicates the proposed area of installation of equipment for the MSAT II Project.

A description of the new and modified units associated with this permit application is provided in the following sections. These process descriptions include general descriptions of process equipment with their upgrades (where applicable) and do not include all equipment that will be installed or modified. For example, there are heat exchangers, pumps, piping components, instruments, etc. that will be included in these projects but not explicitly listed in this permit application.

3.1.1 Increased Crude Oil Throughput

This project involves the following modifications:

- Removal of the firing rate limit at the 581 Crude Unit heater and replacement of the 581 Crude Unit atmospheric distillation tower. This heater was designed for a firing rate of 233 MM Btu/hr but limited by permit¹ to a firing rate of 133.2 MM Btu/hr. This project includes removal of the current firing rate limit to allow operation of this heater at its maximum capacity which will allow the 581 Crude Unit to operate at a higher crude oil throughput. To accommodate this increased throughput the 581 Crude Unit atmospheric distillation tower will also be replaced.
- Modification of the 583 Vacuum Unit. The vacuum tower system and vacuum heater will be modified to allow for an increase in charge rate.
- Allow the combustion of sweetened refinery fuel gas in the Coker Flare. SWRC
 has recently discussed with the Division its issues regarding fuel gas balance and
 routine flaring events. While SWRC is striving to operate in fuel gas balance,
 SWRC has identified operational scenarios where it may need the capability to
 combust sweetened refinery fuel gas in its flare system. Given this need, this
 construction permit application includes provisions for routing excess sweetened
 refinery fuel gas to the Coker Unit Flare during periods of fuel gas imbalance.

3.1.2 Elimination of Firing Rate Limits on Select Heaters

This project is needed to eliminate the need for current heater refinery fuel gas flowmeter testing requirements and includes removal of the firing rate limits at the #1 IIDS heater, Naphtha Splitter heater and Hydrocracker H5 heater.

3.1.3 New Naphtha Splitter and/or Benzene Saturation / Isomerization Unit (MSAT II Project)

SWRC is currently assessing the refinery's capability to meet the MSAT II provisions with the current refinery configuration. If it is determined the current refinery configuration cannot meet these standards, SWRC may elect to install a new Naphtha Splitter and/or Benzene Saturation/Isomerization (BSI) unit. This project will provide SWRC options for complying with current motor gasoline benzene content standards of the MSAT II rule.

The project includes the installation of new refinery process equipment with pumps, valves, and other fugitive emissions sources, an associated gas-fired heater and a new 100,000 barrel floating-roof storage tank.

3.1.4 Sour Water Stripper System Upgrade

SWRC is planning to install a new sour water stripper (#3 SWS) to provide additional capability to treat sour water and provide redundancy during periods of downtime for the current sour water stripper system. SWRC is planning to increase the capacity of the existing sour water stripping system that includes #1 SWS and #2 SWS.

3.1.5 New Emergency Air Compressor

A new diesel fuel driven emergency air compressor will be installed to supplement the existing emergency air supply system. The emergency air compressor system supplies instrument air to the refinery in the event of a power failure.

3.2 Modified Equipment

The following existing units will be modified (either physically modified or modified by removal of a current permit limitation) in conjunction with the Crude Oil Optimization Project. A description of the modified units is provided in the following sections. These process descriptions include general descriptions of process equipment with their upgrades (where applicable) and do not include all equipment that will be installed or modified. For example, there may be heat exchangers, pumps, piping components, instruments, etc. that will be included in this project but not explicitly listed in this permit application.

3.2.1 581 Crade Unit

SWRC is planning to climinate the current firing rate limit at the 581 Crude Unit heater. Removal of this limit will allow the 581 Crude Unit to operate at enhanced throughputs up to its inherent hydraulic capacity. Additionally, this project will also replace the 581 Crude Unit atmospheric distillation tower.

A summary of the current firing rate limit, design firing rates and actual firing rates (average of 2009 and 2010) is provided below for the 581 Crude Unit heater.

Heater	Current Firing	Design Firing	Actual Firing Rate
	Rate Limit	Rate Capacity	Average 2009 and
	(MM Btu/hr)	(MM Btu/hr)	2010 (MMBtu/hr)
581 Crude Unit Heater	133.2	233.0	102.5

3.2.2 583 Vacuum Unit

SWRC is planning to modify the 583 Vacuum Unit to allow the processing of additional reduced crude produced by the 581 Crude Unit modification. This unit will be physically modified as follows:

- Rework of the 583 heater heat exchange system. The existing heater has sufficient heat release capacity to process the additional reduced crude produced by the 581 Crude Unit.
- Installation of a larger vacuum producing system required to address higher cracked gas (non condensables) volumes associated with the 581 Crude Unit modification. The vacuum producing system uses eductors, with steam being the motive fluid, to produce vacuum. The increased steam needed for the eductors will be provided by waste heat recovery steam generation system on the 581 Crude Unit heater. In addition, the #1 H2 plant and #2 H2 plant both have waste heat recovery systems that will be used to meet steam requirements for this project. This project will result in a net steam increase from waste heat recovery systems and will not require any additional steam to be produced by refinery boilers. The following table provides the estimated steam demand for the refinery pre and post project.

Estimated*	Estimated Pre-Project Steam Demand from Boilers	Estimated Post-Project Steam Demand from Boilers	
SWRC Steam Demand	(total lbs/hr steam)	(total lbs/hr steam)	
	262,704	254,078	

^{*} Note the estimated steam demand values are calculated assuming maximum production rates and do not necessarily reflect past actual refinery steam consumption.

3.2.3 Coker Unit Flare

SWRC is planning to modify the Coker Unit Place to allow the routing of excess sweetened refinery fuel gas to the Coker Flare during periods of refinery fuel gas imbalance. This modification will include:

 Installation of piping and piping components from the refinery sweet fuel gas drum to the Coker Unit Flare.

The maximum capacity of the Coker unit Flare will remain unchanged. No upstream units will be affected by modification of the Coker Unit Flare (re: Section 3.4). In addition, a Continuous Emissions Monitoring System (CEMS) meeting the provisions of NSPS Subpart Ja will be installed to monitor the H₂S content of the flare gas.

3.2.4 #1 HDS Heater, Naphtha Splitter Heater and Hydrocracker H5 Heater

These heaters were recently retrofitted with Ultra Low NOx Burners (ULNB) and had firing rate limits imposed by permit². The firing rate limits were needed because the ULNB used in the retrofits had higher design firing rates than the burners they replaced. Because of these firing rate limits, SWRC is required to confirm the accuracy of the fuel gas flow meters with annual testing³. This project includes removal of the current firing rate limits to allow operation of these heaters at their design firing rates without the need for annual fuel gas flow meter testing.

A summary of the current firing rate limits, design firing rates and actual firing rates (average of 2009 and 2010) is provided below.

² Permit MD-1381A2, Condition 28 (1/29/08)

³ Permit MD-1381A2, Condition 29 (1/29/08)

Heater	Current Firing Rate Limit (MM Btu/hr)	Design Firing Rate Capacity (MM Btu/hr)	Actual Firing Rate Average 2009 and 2010 (MMBtu/hr)
#1 HDS heater	24.0	33.4	13.0
Naphtha Splitter heater	34.5	46.3	10.6
Hydrocracker H5 heater	35.7	44.9	21.9

It is important to note these heaters have historically operated well below their currently permitted firing rates and SWRC anticipates operating below these maximum firing rates with the increased crude throughput. SWRC's desire to remove the current firing rate limits is due solely to the elimination of the fuel gas flow meter annual testing requirements.

3.2.5 Naphtha Splitter (MSAT II)

As part of the MSAT II project, SWRC will require improved fractionation in the Naphtha Splitter Unit to obtain a more precise distillation cut of the intermediate stream sent to the BSI Unit. Please note that beyond the potential fugitive emission component increases previously identified, these updates to the Naphtha Splitter Unit will not impact the existing Naphtha Splitter emission source (i.e., fired heater) potential to emit. Although this heater is not being physically modified, it has been included in the emissions analysis as part of a modified unit. These updates to the #1 HDS will include:

- Replace the existing Naphtha Splitter tower with a larger tower with 60 trays;
- Modify the Reactor Section by improving the hydraulics (piping and pumps)

3.2.6 #1 Sour Water Stripper (#1SWS) and #2 Sour Water Stripper (#2SWS)

SWRC is planning to increase sour water charge rate capacity of the #1 SWS and #2 SWS with the installation of new sour water charge pumps.

3.3 New Equipment

3.3.1 Fugitive Emission Components (Increased Crude Oil Throughput)

There may be minor additions of new fugitive emission components associated with the modified equipment (re: Section 3.2) and a conservative estimates of these new components is included in this application.

3.3.2 MSAT II Project

The MSAT II Project includes the following construction plans for new sources:

- Construct a new process unit, the BSI Unit, to reduce the benzene content of gasoline while maintaining its octane rating. This process unit will include a new gas fired heater with a heat input capacity of 50 MM Btu/hr.
- Construct a new 100,000 barrel (bbl) floating roof tank for storage of gasoline and intermediate products.
- Construct the interconnecting process and utility piping to the BSI Unit into the existing refinery process and utility systems. Pumps, flanges, valves, drains, and other piping components will be installed which may emit fugitive VOCs.

The MSAT II project also results in modification of the existing Naphtha Splitter tower by replacing it with a larger tower (see section 3,2.5). A new closed-loop glycol system will also be installed for the project, although this system will not emit any air pollutants.

3.3.2.1 BSI Unit (MSAT II)

The purpose of this process unit is to reduce the benzene concentration in gasoline while preserving the octane rating of the product.

BenfreeTM is a process which reduces benzene in the feedstock through integrated reactive distillation. The process uses high-pressure pumps to withdraw benzene rich light fraction from the splitter where the benzene is converted to cyclohexane. Consequently, this conversion process affects the octane rating of the product. Note that the octane rating is distinct from the actual concentration of isomers of octane present in the product; octane rating is a measure of gasoline's tendency to pre-combust in an internal combustion engine.

In order to preserve the octane rating of the gasoline, SWRC will also utilize the Par-IsomTM process in conjunction with the BenfreeTM process. The Par-IsomTM

Sinclair Wyoming Refining Company Crade Oil Optimization Project Transmittal of Construction Permit Application October 10, 2011, rev. 0

process uses a catalytic reaction to isomerize the hydrocarbon molecules, creating a blend with the appropriate octane rating.

The combination of the Benfree™ Par-Isom™ process trains are designated as the BSI Unit by the SWRC retinery. A new 50 MM Btu/hr rated gas-fired heater will be installed as part of the BSI Unit.

3.3.2.2 BSI Product Tank (MSAT II)

SWRC will construct a new, external floating roof storage tank to support the new BSI Unit operation. This tank will have a nominal storage capacity of 100,000 bbl, and will primarily be used to store gasoline intermediate with a Reid Vapor Pressure (RVP) of approximately 4. However, under certain circumstances this tank may hold other materials, so emission calculations for the tank were developed assuming the contents is gasoline with a RVP of 6.

The tank will have the following design characteristics:

Type of Tank: External Floating Roof

Diameter: 120 feet

Throughput: 10,327 Barrels per day (Bpd) (typical value - for emissions

estimation only) Paint color: White

Roof Type: Pontoon Deck Tank Construction: Welded Primary Seal; Mechanical Shoe Secondary Seal; Rim-Mounted

Fittings: Access Hatches, Roof Legs, Non-Slotted Guidepoles

3.3.2.3 Fugitive Emission Components (MSAT II)

The new BSI Unit, the updates to the #1 IIDS unit and the new storage tank will require the installation of piping components such as valves, pumps, flanges, and drains. The BSI Unit will also require the construction of interconnecting process and utility piping to tie the new unit into the refinery process and utility systems, which will require the installation of additional piping components. The new equipment in VOC service will result in potential fugitive emissions and are incorporated into the project emission calculations.

3.3.3 #3 Sour Water Stripper (3#SWS)

SWRC is planning to install a new sour water stripper (#3SWS) to provide additional capability and to treat sour water during periods of downtime for the current sour water stripper system.

3.3.4 New Emergency Air Compressor

SWRC operates an emergency air compressor system to provide instrument air to critical instruments in the event of a power failure. A new emergency air compressor will be installed to supplement the existing emergency air supply system. The new air compressor will be driven by a diesel engine meeting the provisions of 40 CFR Part 89.112 for Tier III engines. This engine will be limited to 500 hours of non emergency operation.

3.4 Non-Modified Equipment

The following units will not be physically modified or undergo a change in method of operation but may see an incremental increase in actual emissions from associated process unit emission sources as a result of the increase in crude oil throughput (section 3.1.1), elimination of the selected heater firing rates (section 3.1.2), operation of the MSAT II project (section 3.1.3) or operation of the upgraded sour water stripper system (section 3.1.4). The process units associated with the non-modified equipment have sufficient capacity to process the incremental increases in intermediate streams associated with the increased crude oil throughput. Emission sources associated with the non-modified equipment will have no increases in allowable emission rates with respect to previous permitting actions. Heater firing rates associated with the non-modified equipment will have no increases above the values used to calculate the allowable emission rates in previous permitting actions.

3.4.1 #1 and #2 Hydrogen Plants

Increased crude throughput will result in increased Hydrogen (H2) generation (needed for hydrotreating) at the refinery which will result in incremental increases in the firing rates of the heaters associated with these units. In addition, the new BSI Unit is expected to require a supply of up to 4 million standard cubic feet per day (MMscfd) of hydrogen beyond the amount of hydrogen needed for current refinery operations. This increased hydrogen may be produced by either the existing #1 or #2 Hydrogen plants and will require an incremental increase in the firing rate of the #1 and/or #2 Hydrogen plant Heaters.

During BSI Unit startup, a small incremental increase in steam production will be required. Startup will only occur for a two-day period approximately twice per year. This steam will be provided from the increased firing of the 581 Crude Unit heater, #1 H2 plant and #2 H2 plants which all have waste heat recovery systems used to produce steam.

Singleir Wyoming Refining Company Crude Oil Optimization Project Transmittal of Construction Permit Application October 10, 2011, rev. 0

3.4.2 #1 HDS

As identified previously, increased crude throughput will result in increased hydrotreating at the #1 HDS which will result in an incremental increase in the firing rate of the #1 HDS heater associated with this unit.

As part of the MSAT II project, SWRC will require #1 IIDS to process the BSI Unit feedstock but will not result in any incremental increase in the firing rate of associated heaters. As a result of this project, light naphtha from the Hydrocracker and the 582 Crude Unit will now be fed to the #1 IIDS. However, heavy naphtha from the Hydrocracker Unit, which is currently fed to the #1 IIDS, will now be fed directly to the LEF Tower and Naphtha Splitter instead (see section 3.4.3). The flow of heavy Hydrocracker naphtha exceeds the combined flow of the two light naphtha streams, therefore the #1 HDS will not receive an overall increase in feed rate as a result of the MSAT II project. Note that beyond the potential fugitive emission component increases previously identified as part of the MSAT II Project, these updates to the #1 HDS will not impact any existing #1 IIDS emission source (i.e., fired heater).

3.4.3 Light Ends Fractionator (LEF)

Increased crude throughput will result in increased throughput at the LEF which will result in an incremental increase in the firing rates of the heater associated with this unit.

As part of the MSAT II project, SWRC will require LEF Unit to process the BSI Unit feedstock. Please note that beyond the potential fugitive emission component increases previously identified, these updates to the LEF Unit will not impact any existing LEF emission sources (i.e., fired heater) at the SWRC refinery nor increase the processing capacity of the unit. As a result of this project, heavy naphtha from the Hydrocracker Unit, which is currently fed to the #1 IIDS Unit, will now be fed directly to the LEF Tower.

There will be incremental increases in throughputs to the Light Ends Fractionator Unit and Naphtha Splitter Unit as a result of the increased firing rate at the 581 Crude Unit which will result in small incremental increases in the firing rates of the two heaters associated with these units.

3.4.4 781 Reformer

Increased crude throughput will result in increased throughput at the 781 Reformer which will result in an incremental increase in the firing rates of the heaters associated with this unit (reformer heaters 1 through 3 and the stabilizer heater). Currently, heavy naphtha from the Hydrocracker Unit is fed to the #1 HDS Unit. After implementation of the MSAT II Project, this heavy naphtha will

Sinclair Wyoming Refining Company Crude Oil Optimization Project Transmittal of Construction Pennit Application October 10, 2011, rev. 0

instead be fed to the LEF Tower and processed through the Naphtha Splitter that will also result in an incremental increase in reformer heater firing.

3.4.5 #2 HDS

Increased crude throughput will result in increased hydrotreating at the #2 HDS which will result in an incremental increase in the firing rates of the heater associated with this unit. Light cycle oil (a kerosene/diese) range intermediate) from the FCCU may be routed to the #2 HDS Unit for further processing. Its capacity is limited by the hydraulic capacity of its charge pumps.

3.4.6 #3 HDS

Increased crude throughput will result in increased hydrotreating at the #3 HDS which will result in an incremental increase in the firing rates of the heater associated with this unit. Light cycle oil (a kerosene/diesel range intermediate) from the FCCU may be routed to the #3 HDS Unit for further processing. Its capacity is limited by the hydraulic capacity of its charge pumps.

3.4.7 #4 HDS

Increased crude throughput will result in increased hydrotreating at the #4 HDS which will result in an incremental increase in the firing rates of the heaters associated with this unit. The #4 HDS Unit supplies hydrotreated gasoil feed to the FCCU. Its capacity is limited by the hydraulic capacity of its charge pumps.

3.4.8 Fluid Catalytic Cracking Unit (FCCU)

Increased crude throughput will result in increased throughput at the FCCU which will result in an incremental increase in emissions from this source. The FCCU receives hydrotreated gasoils from the #4 HDS. Its capacity is limited by the hydraulic capacity of its charge pumps and it air blowers.

3.4.9 Hydrocracker Unit (HCU)

Increased crude throughput will result in increased hydrotreating at the HCU which will result in an incremental increase in the firing rates of the heaters associated with this unit. Light cycle oil from the FCCU may be routed to the HCU for further processing. Coker gasoil from the Coker Unit may also be sent to the HCU for further processing. Its capacity is limited by the hydraulic capacity of its charge pumps.

3.4.10 Gas Recovery Unit (GRU)

Increased crude throughput will result in increased throughput at the GRU. Overhead gases generated by the FCCU are sent to the GRU for processing/separation prior to sending them to the Alky Unit, Poly Plant or to

Sinclair Wyoming Refining Company Crude Oil Optimization Project Transmittal of Construction Permit Application October 10, 2011, rev. 0

storage. Its capacity is limited by the hydraulic capacity of its charge pumps. There are no point sources of emissions associated with the GRU.

3,4,11 Saturate Gas Recovery Unit (SGRU)

Increased crude throughput will result in increased throughput at the SGRU. Overhead gases generated by the HCU, Naphtha Splitter and Reformer are sent to the SGRU for processing/separation prior to sending them to the Alky Unit, Poly Plant or to storage. Its capacity is limited by the hydraulic capacity of its charge pumps. There are no point sources of emissions associated with the SGRU.

3.4.12 Poly Plant

Increased crude throughput will result in increased throughput at the Poly Plant. The Poly Plant processes gases from the GRU and produces a gasoline bleudstock that is sent to storage. Its capacity is limited by the hydraulic capacity of its charge pumps. There are no point sources of emissions associated with the Poly Plant.

3.4.13 Alky Unit

Increased crude throughput will result in increased throughput at the Alky Unit. The Alky Unit processes olefins generated by the FCCU and butane/butylenes from storage to produce alkylate, a gasoline blendstock. Its capacity is limited by the hydraulic capacity of its charge pumps. There are no point sources of emissions associated with the Alky Unit.

3.4.14 Coker Unit

Vacuum Tower bottoms and Slurry from the FCCU (both heavy hydrocarbon intermediates) may be routed to the Coker Unit for further processing. Increased crude throughput will result in increased throughput at the Coker Unit which will result in an incremental increase in the firing rates of the heater associated with this unit. Its capacity is limited by the hydraulic capacity of its charge pumps.

3.4.15 Sulfur Recovery Plants (SRPs)

Intermediate streams throughout the refinery are routed to the various hydrotreater units for sulfur removal. The resulting acid gas generated by the hydrotreating units is processed through the following SRP systems:

- #1 and #2 Sulfur Recovery Units (#1SRU, #2 SRU) and their associated Tail Gas Treatment Unit (#1TGTU)
- The SRP #3 Sulfur Recovery Unit (#3SRU) and its associated Tail Gas Treatment Unit (#3TGTU)
- #4 Sulfur Recovery Unit (#4SRU) and its associated Tail Gas Treatment Unit (#4TGTU)

Sinclair Wyoming Relining Company Crude Oil Optimization Project Transmittel of Construction Permit Application October 10, 2011, rev. 0

In addition, sour water stripper overhead gases from #1SWS, #2SWS and #3SWS are routed to #2SRU, #3SRU and/or #4SRU for processing. Increased crude throughput will result in an incremental increase in throughput at all SRPs.

3.4.16 Light Oil Loading Rack (LOLR)

Increased crude throughput will result in increased throughput at the LOLR. The increase in finished products may be distributed to commerce via the LOLR System. Its capacity is limited by the hydraulic capacity of its loading pumps and market demand.

3.4.17 Storage Tanks

Increased crude throughput will result in increased working loss emissions from the majority of the crude, intermediate and product storage tanks at the refinery.

3.4.18 Pressure Vessels

Increased crude throughput will result in increased pressure vessel throughput. There are no routine emissions associated with the pressure vessels.

3.4.19 Asphalt Plant

The increase in the production of vacuum tower bottoms or FCCU slurry associated with this project may be directed to the Asphalt Plant for processing. Please note the #2 Asphalt heater has been idled and is in the process of being permanently removed from service.

3.5 Unaffected Units

This section describes process units at the refinery that will not be debottlenecked, physically modified or experience a change in the method of operation as a result of the Crude Oil Optimization Project. The capacities of these process units are limited by the equipment as is but are identified in the following for application completeness.

3.5.1 582 Crude Unit / 582 Vacuum Unit

Throughput to these units will be unaffected by the increase in crude rate to the 581 Crude Unit. The 582 Crude Unit and 582 Vacuum Unit capacity is limited by the hydraulic capacity of their charge pumps.

3.5.2 Boilerhouse

The Crude Oil Optimization project will require additional steam generation for use as stripping steam at the 581 Crude Unit and 583 Vacuum Unit eductor system. Additionally, during normal operations, the new BSI Unit will not require any additional steam compared to current conditions, as the project

Sinclair Wyoming Refining Company Crude Oil Optimization Project Transmittel of Construction Permit Application October 10, 2011, rev. 0

involves gasoline-range intermediates, which do not require steam tracing. However, a small amount of steam will be required during startup of the BSI Unit. Startup of this unit is conservatively estimated to occur twice per year, and will take place over two days. During these startup periods, the refinery will be required to provide an incremental increase in steam that may be supplied by any of the steam generators at the refinery.

However, as identified previously in Section 3.2.2, this project will result in a net steam increase from waste heat recovery systems and will not require any additional steam to be produced by refinery boilers.

3.5.3 Flare Gas Recovery (FGR) System

SWRC is currently upgrading the FGR system to comply with the provisions of the Consent Decree⁴. These upgrades include several provisions to reduce the generation of refinery gas vented to the flare. After completion of these upgrades, SWRC believes the FGR system will be adequate to capture the routinely generated refinery fuel gases for treatment in the refinery's amine system for ultimate use as NSPS J and Ja compliance refinery fuel gas.

3.5.4 Oily Water Treatment System

The 581 crude unit and downstream units associated with the Crude Optimization Project will not see an increase in water throughput or wastewater generation associated with the Crude Optimization Project. The 581 desalter is designed to operate over a range of water/oil ratios, and running at the increased crude rate will result in operation at a lower water/oil ratio with the overall oily water generation remaining constant.

SWRC is currently in the process of upgrading its Oily Water treatment system in accordance with its settlement agreement with WDEQ/SHWD⁵. The operation of the upgraded Oily Water treatment system and enhanced controls will result in no additional emissions from waste water treatment.

3.5.5 Cooling Towers

Increased crude throughput may result in increased duty at the refineries cooling tower systems that include the following:

- 583 Cooling Tower
- Fluor Cooling Tower
- Marley Cooling Tower

⁴ Civil Action No. 08CV 020-D

⁵ Settlement Agreement for Notice of Violation Docket # 4713-10

Sinclair Wymning Refining Company Crude Oil Optimization Project Transmittal of Construction Permit Application October 10, 2011, rev. 0

Coker Cooling Tower

These cooling towers operate at a constant water circulation rate that is independent of duty. Total dissolved solids (TDS) and Total suspended solids (TSS) content of the circulating water are controlled to prescribed levels currently in place at the refinery. Because there will be no change to the water circulation rate or TSS/TDS levels in the water, there will be no emission changes to these cooling towers associated with this project.

Additionally, there will be no change to the operation of the 582 Cooling Tower as a result of the project.

4.0 Permit Limitations

4.1 Estimated Emissions

4.1.1 New Sources

The proposed PTE (or proposed allowable emissions) for the new sources associated with the Crude Oil Optimization Project are presented in Table 4.1. This table includes proposed potential emissions for particulate matter (PM)/particulate matter smaller than 10 microns (PM₁₀)/ particulate matter smaller than 2.5 microns (PM_{2.5}), sulfur dioxide (SO₂), oxides of nitrogen (NO_X), carbon monoxide (CO), and volatile organic compounds (VOC).

Table 4.1 Potential to Emit - New Sources

Operating Unit	Emission Source	Firing Rate for Allowable Emissions (MMBm/hr)	PM/PM ₁₀ /PM _{2.5} Emissions TPY	SO ₂ Emissions TPY	NO _x Emissions TPY	CO Emissions TPY	VOC Emissions TPY
New Sources - Potentia	ni to Emit:						
BSI	BSI Heater	50.0	0.4	1.9	6.6	8.8	1.2
Tank Farm	New Tank (100M BBL)	N/A	N/A	N/A	N/A	N/A	7.8
Bollerhouse	New Emergency Air Compressor	N/A	<0.1	<0.1	0.7	0.6	0.2
Equipment Leaks	Fugitive Emissions/Drains	N/A	N/A	N/A	N/A	N/A	7.8
Total New Sources			0,4	1.9	7.3	9.4	17.0

Notes:

4.1.2 Modified Sources

Table 4.2 presents the PTE from the modified sources associated with the project.

Table 4.2 Potential to Emit -- Modified Sources

Operating Unit	Emission Source	Firing Rate for Allowable Emissions (MMBtu/hr)	PM/PM ₁₀ /PM _{2 s} Emissions TPY	SO ₂ Emissions TPY		CO Emissions TPY	VOC Emissions TPY
Modified Sources - Pot	tential to Emit:						
581 Crude Unit	581 Crude Heater	233.0	1.9	8.9	30.6	40,8	5.5
583 Vacuum Unit	583 Vacuum Heater	64.2	0.5	2,5	8.4	11.2	1.5
Coker	Coker Unit flure	100.0	0.8	3.8	29.8	162.1	27.6
781 Reformer	Naphtha Splitter Heater	46.3	0.4	1.8	7.1	8.1	1.1
Hydrocracker	Heater HS	44.9	0.4	1.7	6.9	7.9	1.1
#UHDS	#1HDS Heater	33.4	0.3	1.3	5.1	5.9	0.8
Total Modified Sources			4.3	20.0	87.9	236.0	37.6

 $[\]ensuremath{\mathbb{L}}$. PM, PM $_{10}$ and PM $_{2.5}$ emissions are assumed equal for gas combustion sources.

4.1.3 Non-Modified Sources

The estimated incremental emissions from non-modified/ancillary sources are presented in Table 4.3. The emission rates shown are the emissions that will result from the incremental increases involving these sources.

Table 4.3 Potential to Emit - Non-Modified Sources

Operating Unit	Emission Source	Firing Rate for Allowable Engissions (MMBtu/hr)	PM/PM ₁₀ /PM ₂₅ Enjissions TPY	SO ₂ Emissions	NO _X Emissions TPY	CO Emissions TPY	VOC Emissions TPY
Non-Modified Source						HX	
781 Reformer	LEP Heater	24.0	0,2	0.9	3.7	4.2	0.6
THE RESIDENCE	#1 Reformer Heater	44.6	0.4	1.7	6.8	7.8	Li
	#2 Reformer Heater	74.8	0.6	2,9	11.5	13.I	1.8
	#3 Reformer Heater	22.4	0.2	0.9	3.4	3.9	0.5
	Stabilizer Heater	11.1	<0.1	0.4	1.7	1.9	0.3
Hydrocracker	Heater III/II2	38.0	0.3	1.5	5.8	6.7	0.9
•	Heater U3	56.0	0.5	2.L	8.6	9.8	1.3
	Heater H4	57.0	0.5	2.2	8.7	10,0	1.3
Coker	Coker Heater	145,0	1.2	5.5	21.0	25.4	3.4
	Coker (Material Handling)	N/A	Insignificant	N/A	N/A	N/A	N/A
780 FCCU	780 FCC Heater B3	10.0	<0.1	0.4	10,1	3.6	0.2
	780 FCC Heater H2	19.4	0,2	0.7	[19.5	7.0	0.5
	780 FCCU Regenerator	N/A	70.5 / 70.5 / 48.7	57.8	66.6	504.0	23.3
#2 HDS	Charge Heater	28.0	0.2	1. i	4.3	4.9	0.7
#3 HDS	Charge Heater	18.0	0.1	0.7	2.8	3.2	0.4
#4 HOS	H2 Heater (25-HT-101)	22.0	0.2	0.8	3.4	3.9	0.5
	H2 Henter (25-HT-102)	24.0	0.2	0.9	3.7	4.2	0.6
#1 H2 Plant	#1 H2 Plant Heater	288.0	2.3	0.5	82.0	103.9	6.8
#2 H2 Plant	#2 H2 Plant Heater	288.0	2.3	5.6	12.6	25.2	6.8
#1,#2,#3,#4 SRU	#1,#3,#4 TGTU	N/A	0.2	84.6	9.2	39,4	0.7
Asphalt Loading	Asphalt Heater #1	8.0	<0.1	0.3	8.1	2.9	0,2
Tank Parm	Working Losses	N/A	N/A	N/A	N/A	N/A	0.7
Light Oil Loading	Loading Rack Flare	N/A	N/A	N/A	0.8	2.1	2.1
Total Medified Source	cs		80.3 / 80.3 / 58.6	171.4	294.3	787.1	54.7

Emissions calculations supporting Tables 4.1 through 4.3 for the new, modified, non-modified, and decommissioned sources associated with this project are provided in the following Appendices:

Appendix A: SO₂ Emission Calculations Appendix B: NO_x Emission Calculations

Appendix C: PM/PM₁₀/PM_{2.5} Emission Calculations

Appendix D: CO Emission Calculations
Appendix E: VOC Emission Calculations
Appendix F: Fugitive Emission Calculations
Appendix G: HAP Emission Calculations
Appendix H: PSD Netting Emissions

Sinclair Wyoming Refining Company Crude Oil Optimization Project Transmittal of Construction Permit Application October 10, 2011, rev. 0

Appendix I: New and Modified Heater - SCR Cost Analysis

Appendix J: Detailed Ambient Air Quality Modeling Analysis

4.2 Emissions Calculation Basis

A discussion of the basis for the calculations provided in Appendices A through I' is provided in the following. Note that only the sources that are new, modified or may see an incremental increase in ancillary emissions are listed. The emission calculation basis for all sources unaffected by the project is reflected in their corresponding construction pennits and permit applications.

4.2.1 SO₂ Emissions

New and Modified Heaters

The new BSI Heater and the following modified heaters will fire refinery fuel gas.

- 581 Crude Heater
- 583 Vacuum Heater
- Naphtha Splitter Heater
- Heater HS
- #1HDS Heater

The fuel gas fired in these heaters will be required to meet the following refinery fuel gas H_2S limits per 40 CFR 60.102a(g)(1)(ii):

- 162 ppmvd (3-hr rolling average)
- 60 ppmvd (365-day rolling average)

To estimate SO₂ emissions, all H₂S in the fuel gas is assumed to be converted to SO₂. Hourly emissions are based on the 3-hour average and annual emissions are based on the 365-day average.

Coker Unit Flare

The Coker Unit Flare is an NSPS J compliant flare. As part of this permitting action SWRC will require the combustion of sweetened refinery fuel gas in the Coker Flare to accommodate potential periods when the refinery may have to operate in a fuel gas imbalance condition. The fuel gas fired in these heaters during non-process upset conditions will be required to meet the following refinery fuel gas H₂S limits per 40 CFR 60.102a(g)(1)(ii):

- 162 ppmvd (3-lir rolling average)
- 60 ppmvd (365-day rolling average)

To estimate SO₂ emissions, all H₂S in the fuel gas is assumed to be converted to SO₂. Hourly emissions are based on the 3-hour average and annual emissions are based on the 365-day average.

Sinclair Wyoming Refining Company Crude Oil Optimization Project Transmittal of Construction Permit Application October 10, 2011, rev. 0

Non-Modified Heaters

These sources will be fired with refinery fuel gas. The refinery is currently required to limit fuel gas II₂S concentration to 0.1 grains/dsef at all fired heaters (re: Permit 30-145). This concentration is equivalent to 162 parts per million by volume, dry basis (ppmvd) and is the same concentration limit required in New Source Performance Standards: Subpart J (re: 40 CFR 60.104).

To estimate SO₂ emissions, all H₂S in the fuel gas is assumed to be converted to SO₂.

#2 Hydrogen Plant

In addition to fuel gas, the #2 Hydrogen Plant fires the gas from the Pressure Swing Adsorption (PSA) Unit used to purify the hydrogen produced in the plant. This PSA gas is required to have a very low concentration of II₂S for proper hydrogen plant operation and is estimated to have an H₂S concentration of 0.1 ppmvd. The #2 Hydrogen Plant heater is subject to NSPS Subpart Ja, and the fuel gas co-fired in the heater has the same sulfur content as the gas fired in the new and modified heaters described above. To estimate emissions, all H₂S in the fuel is assumed to be converted to SO₂.

#1 Hydrogen Plant

The #1 Hydrogen Plant fires only purchased natural gas (rather than refinery fuel gas) and PSA gas. The purchased natural gas is inherently low in II₂S and is estimated to have an H₂S concentration of 0.0025 grains per standard cubic foot. The PSA gas is required to have a very low concentration of H₂S for proper hydrogen plant operation and is estimated to have an II₂S concentration of 0.1 ppmvd. For emission calculation purposes it is conservatively estimated that the purchased natural gas and PSA gas is estimated to have an H₂S concentration of 0.1 ppmvd and all II₂S in the fuel is assumed to be converted to SO₂.

SRPs

SO₂ emissions from the SRPs are estimated based on engineering calculations derived from the exhaust flow rate and SO₂ concentrations permitted under MD-1381A2.

FCCU

SO₂ emissions from the FCCU are estimated based on engineering calculations derived from the FCCU exhaust flow rate and SO₂ concentrations permitted under MD-10591.

LOLR

SO₂ emissions from the LOLR are deminimis as only sweetened fuels are dispensed at the loading rack and will not result in additional SO₂ emissions to be quantified.

Sinclair Wyoming Refining Company Crude Oil Optimization Project Transmitted of Construction Permit Application October 10, 2011, rev. 6

New Emergency Air Compressor

SO₂ emissions from the new emergency air compressor are based on consuming #2 Diesel fuel with a sulfur content of 500 ppmw at maximum design operation for 500 hrs/yr.

4.2.2 NO_X Emissions

New BSI Heater

For the proposed 50 MMBtu/hr fuel gas-fired heater for the new BSI Unit, SWRC is proposing to control NO_X emissions using low-NO_X burner technology. NO_X emissions using this technology are estimated to be 0.030 lb/MMBtu. A Best Available Control Technology (BACT) analysis supporting the use of low-NO_X burners is provided in Appendix I.

Coker Unit Flare

 NO_X emissions from the Coker Unit Flare are conservatively estimated assuming max flaring of 100 MMBtu/hr of sweetened refinery fuel gas and a NO_X emission factor of 0.068 lb/MM Btu taken from AP - 42 Emission Factor for Flares Table 13.5-1.

Existing Heaters

These combustion sources are operated using good combustion practice. SWRC will continue to operate these sources in compliance with the refinery's permit conditions. Emissions of NO_X from combustion sources associated with the Crude Optimization Project are estimated using the following emission factors:

Operating	Emission	Emission Factor
Unit	Source	lb NOX/MM Btu
Coker	Coker Heater	0.033
#2 H2 Plant	#2 H2 Plant Heater	0.0100
581 Crude Unit	581 Crude Heater	0.030
583 Vacuum Unit	583 Vacuum Heater	0.030
Hydrocracker	Heater H1/H2	0.035
	Heater H3	0.035
	Heater H4	0.035
	Heater H5	0.035
780 FCCU	780 FCC Heater B3	0.230
	780 FCC Heater H2	0.230
#1 HDS	#1HDS Heater	0.035
781 Reformer	Naphtha Splitter Heater	0.035
	LEF Heater	0.035
	#1 Reformer Heater	0.035
	#2 Reformer Heater	0.035 0.035
	#3 Reformer Heater	0.035
	Stabilizer Heater	0.035
#I HDS	H2 Heater (25-HT-101)	0.035
	H2 Heater (25-H1-102)	0.035
#1 H2 Plant	#1 II2 Plant Heater	0.065
Asphalt Loading	Asphalt Heater #1	0.230
'	Asphalt Hester #2	0.230
#2 HDS	Charge Heater	0.035
#3 HDS	Charge Heater	0.035

SRPs

The SRP emissions of NO_X are estimated based on additional firing in the incinerator of 30 MMBtu/hr and a conservative vendor NO_X emission factor.

FCCU

NO_X emissions from the FCCU are estimated based on engineering calculations derived from the FCCU exhaust flow rate and NO_X concentrations permitted under MD-10591.

LOLR

The LOLR emissions of NO_X from the combustion of controlled vapors are estimated based on the LOLR throughput and vendor emission factor.

New Emergency Air Compressor

NOx emissions from the new emergency air compressor are based on operating at the 40 CFR Part 89.112 Tier III emission rate at maximum design operation for 500 hrs/yr.

Sinclair Wyoming Refining Company Crude Oil Optimization Project Transmittal of Construction Permit Application October 10, 2011, rev. 0

4.2.3 PM/PM₁₀/PM_{2.5} Emissions

New and Existing Heaters and Coker Unit Flare

The new BSI heater and the existing refinery heaters are fired exclusively with refinery fuel gas and/or purchased natural gas. The #2 Hydrogen Plant heater combusts refinery fuel gas and/or purchased natural gas and PSA purge gas which is a refinery fuel gas generated by the reforming process in the Hydrogen Plants. The #1 Hydrogen Plant heater combusts purchased natural gas and PSA purge gas but not refinery fuel gas. PM emissions from all of these fired sources are estimated by using filterable particulate emissions factors taken from AP-42⁶. Since the emissions result from the combustion of gaseous fuels, which results in fine particulate emissions, both PM₁₀ and PM_{2.5} emissions are assumed to be equal to the total PM emissions.

SRPs

The SRP emissions of PM/PM₁₀/PM_{2.5} are estimated based on additional firing in the incinerator of 30 MMBtu/hr and filterable particulate emissions factors taken from AP-42.

FCCU

PM and PM₁₀ emissions from the FCCU are estimated based on engineering calculations derived from the FCCU coke burn rate and an emission rate limit of 0.9 lb PM per thousand pounds of coke burn. PM_{2.5} emissions are conservatively estimated based on the ratio of PM to PM_{2.5} from stack testing in March 2011.

LOLR

Particulate emissions from the LOLR are deminimis as the LOLR flare is required to be smokeless.

New Emergency Air Compressor

PM emissions from the new emergency air compressor are based on operating at the 40 CFR Part 89.112 Tier III emission rate at maximum design operation for 500 hrs/yr.

4.2.4 CO Emissions

New and Existing Heaters and Coker Unit Flare

These units will be fired with refinery fuel gas and/or purchased natural gas and PSA gas (in the case of the #1 and #2 Hydrogen Plants) and will be operated using good combustion practices. Emissions of CO from these sources are estimated using the following emission factors from AP-42, Vendor Guarantees, and/or existing permit limits:

AP-42, 5th ed, Table 1.4-2 (7/98 revision)

The first of the second section of the first	The experience Authorite through the first specified.	Constitution (State)
		Emission
Omeratina	Emission	Factor
Operating Unit	Source	b CO/MMBtu
	·	
Coker	Coker Heater	0.040
BSI	BSI Fleater	0,040
#2 H2 Plant	#2 H2 Plant Heater	0.020
581 Crude Unit	581 Crude Heater	0.040
583 Vacuum Unit	583 Vacuum Heater	0.040 0.040
Hydrocracker	-	
	Heater H3	0.040
	Heater I14	0.040
Hydrocracker	Heater H5	0.040
780 FCCU	780 I/CC Heater B3	0.082
:	780 FCC Heater 112	0.082
#LHDS	#1HDS Heater	0.040
781 Reformer	Naphtha Splitter Heater	0.040
	LEF Heater	0.040
	#1 Reformer Heater	0.040
	#2 Reformer Heater	0.040
	#3 Reformer Heater	0.040
	Stabilizer Heater	0.040
#I HDS	H2 Heater (25-HT-101)	0.040
	142 Heater (25-HT-102)	0.040
Coker	Coker Unit flare	0.370
#1 H2 Plant	#1 H2 Plant Heater	0.082
Asphalt Loading	Asphalt (Teater #1	0.082
	Asphalt Heater #2	0.082
#2 HDS	Charge Heater	0.040
#3 HDS	Charge Heater	0.040

SRPs

The SRP emissions of CO are estimated based on additional firing in the incinerator of 30 MMBtu/hr and a conservative vendor emission factor.

FCCU

CO emissions from the FCCU are estimated based on engineering calculations derived from the FCCU exhaust flow rate and CO concentration permitted under MD-10591.

LOLR

The LOLR emissions of CO from the combustion of controlled vapors are estimated based on the LOLR throughput and vendor emission factor.

New Emergency Air Compressor

Sincleir Wyoming Refining Company Crade Oil Optimization Project Transmittal of Construction Permit Application October 10, 2011, rev. 0

CO emissions from the new emergency air compressor are based on operating at the 40 CFR Part 89.112 Tier III emission rate at maximum design operation for 500 hrs/yr.

4.2.5 VOC Emissions

New and Existing Heaters and Coker Unit Flare

These units will be fired with refinery fuel gas and/or purchased natural gas and PSA gas (in the case of the #1 and #2 Hydrogen Plants) and emissions are estimated by using emission factors taken from AP-42⁷.

SRPs

The SRP emissions of VOC are estimated based on additional firing in the incinerator of 30 MMBtu/hr and VOC emission factors taken from AP-42.

FCCU

VOC emissions from the FCCU are estimated based on engineering calculations derived from historical FCCU stack testing results.

LOLR

The LOLR emissions of NO_X from the combustion of controlled vapors are estimated based on the LOLR throughput and vendor emission factor.

New Emergency Air Compressor

VOC emissions from the new emergency air compressor are based on operating at the 40 CFR Part 89.112 Tier I emission rate for HC at maximum design operation for 500 hrs/yr.

New BSI Product Tank and Existing Tanks

Emissions of VOC from storage tanks are estimated using the EPA's TANKS4.09d modeling software.

The emissions from the new storage tank were calculated using the tank parameters presented in Section 3.2.2. The product stored in the tank was conservatively assumed to be gasoline with a RVP of 6.

The incremental increase in VOC emissions associated with additional throughput for existing storage tanks is conservatively estimates based on historical working and breathing losses from crude, intermediate, and product storage tanks and the proposed increase in throughput post crude optimization.

Fugitive Emissions

AP-42, 5th ed, Table 1.4-2 (7/98 revision)

Sinchar Wyoming Reliating Company Crade Oil Optimization Project Transmittal of Construction Permit Application October 10, 2011, rev. 0

Fugitive emissions estimates are based on a conservative estimate of piping component to be added with this project and the Protocol for Equipment Leak Emission Estimates screening value correlations and AP-42⁸

Protocol for Equipment Leak Emission Estimates, (EPA-453/R-95-017, Table 2-10: Screening Value correlations, Table 2-2: Relinery Average Emission Factors) AP-42, 4 ed, (Fugitive Emission Factors, Table 9.1-2).

5.0 WAQS&R Chapter 6: Permitting Requirements

This section of the application addresses the permit application requirements presented in Chapter 6 of the WAQS&R.

5.1 WAQS&R Chapter 6, Section 2: Permit requirements for construction, modification, and operation

Chapter 6, Section 2(a)(i) states any person who plans to construct, modify or engage in the use of a facility which will cause an increase in the issuance of air contaminants shall obtain a construction permit before any actual work is begun on the facility. This application is intended to satisfy the requirements of Chapter 6, Section 2.

Chapter 6, Section 2(a)(ii) requires facilities subject to Chapter 6, Section 3 operating permit requirements to submit an application to the Division within twelve months of commencing operation. SWRC will revise and submit its Chapter 6, Section 3 permit application by the required date.

Chapter 6, Section 2(b) details the requirements for applying for a construction permit. These requirements include: submitting the application using forms supplied by the WDEQ/AQD; providing site information, plans, descriptions, specifications, design drawings of the sources; compiling an emissions inventory; and providing a construction schedule.

While SWRC believes the information provided in this application is sufficient for the Division to proceed with processing the application, detailed design information and the construction schedule have not yet been finalized at this time. At the Division's request, SWRC will provide this information when it becomes finalized.

Chapter 6, Section 2(c) states the requirements which must be met before a construction permit is issued. These requirements are detailed as follows.

5.1.1 WAQS&R Chapter 6, Section 2(c)(i): (Compliance with Applicable Rules & Regulations)

SWRC intends to comply with all rules and regulations of the WDEQ/AQD and with the intent of the Wyoming Environmental Quality Act.

5.1.2 WAQS&R Chapter 6, Section 2(c)(ii): (Attainment / Maintenance of Ambient Air Quality Requirements

Air dispersion modeling studies have been conducted to determine compliance with ambient air quality standards. The air quality analyses supporting this permit application were based upon the air dispersion modeling protocol as defined in 40 CFR 51 Appendix W, Guideline on Air Quality Models and the *Wyoming*

Sinclair Wyoming Refining Company Crude Oil Optimization Project Transmittal of Construction Permit Application October 10, 2011, rev. 0

Department of Environmental Quality/Air Quality Division Guidance for Conducting Near-Field Modeling Analyses for Major/PSD Sources (Revised January, 2010), hereafter referred to as the WDEQ-AQD Modeling Guidance.

A pre-modeling protocol was submitted to WDEQ-AQD on September 19, 2011. WDEQ-AQD provided comments to the pre-modeling protocol in an e-mail dated September 20, 2011 from Mr. Josh Nall – NSR Program Principal, Dispersion Modeling. The items discussed in the e-mail were agreed to be valid by SWRC and have been incorporated into this modeling analysis. A detailed discussion of the air dispersion modeling methodology and resulting analyses supporting this permit application is provided in Appendix J. A brief summary of these analyses and results are provided below.

Class I and Class II Area Significant Impact Analyses

Significant impact analyses estimate the ambient impacts from the proposed project and contemporaneous emissions increases and decreases, if applicable, for those pollutants with net emission increases above the Significant Impact Levels (SILs). The results of the significant impact analysis determine whether a cumulative impact analysis (including emissions from other nearby sources) must be performed. If the ambient impacts from the proposed project are less than the SIL for a particular pollutant and averaging period, then no additional modeling is required to meet Federal New Source Review (NSR) permitting requirements.

For the Class I significant impact analysis, all project related emissions increases and decreases, including those during the contemporaneous period, were modeled using a ring of receptors placed at 50km from the middle of the project sources. Maximum impacts at each receptor were compared to the Class I SIL for each applicable pollutant and averaging period. All pollutants and averaging periods showed results below the applicable Class I SILs. Therefore, no additional Class I analyses are required.

For the Class II significant impact analysis, all project related emissions increases and decreases, including those during the contemporaneous period, were modeled using the full base receptor grid. Maximum impacts at each receptor were compared to the Class II SIL for each pollutant and averaging period. Reduced grids of those receptors that showed maximum impacts above the respective SILs were produced for use in the cumulative impact analyses. The SO₂ annual averaging period, PM₁₀ annual and 24-hr averaging periods, and PM_{2.5} annual averaging period showed no receptors with maximum modeled concentrations over the respective SILs. Therefore, no further Class II analyses were required for these respective pollutant averaging periods.

Further detail and specific results of the Class I and II Significant Impact

Sinclair Wyoming Refining Company Crude Oil Optimization Project Transmittal of Construction Permit Application October 10, 2011, rev. 0

Analyses can be found in Appendix J.

Class I and II Area Cumulative Impact Analyses

Cumulative impact analyses were performed to assess compliance with the applicable standard for any pollutant/averaging period for which the project results in significant impacts. These analyses include NAAQS/WAAQS and PSD Increment for Class I and II areas.

All pollutants and averaging periods that showed a significant impact were modeled using the reduced receptor grids as explained above. These results were compared to the applicable NAAQS/WAAQS standards. All pollutants and averaging times showed compliance with all applicable NAAQS/WAAQS standards, including background concentrations provided by WDEQ-AQD.

Any pollutant and averaging period combination that shows a significant impact is also required to show compliance with the applicable Class II increments. In the case of these analyses, all pollutants and averaging times showed concentrations below the increment during the NAAQS/WAAQS phase of modeling. Therefore, compliance with the Class II increments is shown, and no further analyses are required.

No pollutant and averaging period combination showed significance as compared to the Class I SILs at a distance of 50km in any direction. Therefore no comparison to the Class I increments is required.

Further detail and specific results of the Class I and II Area Cumulative Impact Analyses can be found in Appendix J.

WDEO-AOD Inhalation Risk Assessment

An inhalation risk assessment for Hazardous Air Pollutants (HAP) from project related sources was performed. Per WDEQ-AQD guidance, a Tier 1 (screening level) analysis was performed to estimate the chronic carcinogenic risks for the project. The analysis followed the facility-specific assessment guidance developed by EPA as described in the document Air Toxics Risk Assessment Reference Library, Volume 2, Facility Assessment. The analysis used the AERMOD model and base receptor grid per additional WDEQ-AQD guidance. Taking into account the conservative nature of this analysis (assuming an individual is exposed to the maximum modeled concentration continuously for 70 years) and the results obtained from the analysis, it can be determined that the chronic carcinogenic risks from this project are within acceptable levels. Detailed methodology and results of this analysis can be found in Appendix J.

Sinclair Wyoming Refusing Company Crude Oil Optimization Project Transmittal of Construction Permit Application October 10, 2011, rev. 0

5.1.3 WAQS&R Chapter 6, Section 2(c)(iii): (Significant Deterioration of Existing Ambient Air)

Compliance with the Class I and Class II PSD increments are discussed in Section 5.1.2 above, and discussed in detail in Appendix J.

Additional impact analyses are required for PSD permit applications. The three types of additional impacts analyses are growth, soils and vegetation, and visibility.

Growth Analysis

Per the U.S. EPA Guidelines⁹, a growth analysis is required only "if the project would result in a significant shift of population and associated activity into an area—that is, a population increase on the order of thousands of people." A temporary increase in the local population may occur only during the construction period of this project; however, the project will not result in a significant population shift or increase. The number of net new jobs in the community will not result in a significant shift of population. Therefore, a growth analysis is not required.

Soils and Vegetation Analysis

An analysis of soils and vegetation is included in Appendix J. The project is not expected to have an appreciable detrimental effect on soils and vegetation surrounding the project area.

Class I Area Impacts - Air Quality Related Values

A Class I PSD Area is defined as either:

- International park
- National wilderness area greater than 5,000 acres
- National memorial park greater than 5,000 acres
- National park greater than 6,000 acres

The nearest Class I area to SWRC is the Savage Run Wilderness Area, which is approximately 75 kilometers from the location of the project sources.

Per the Federal Land Managers' Air Quality Related Values Workgroup (FLAG) guidance, Class I visibility and Air Quality Related Values (AQRV) analyses

⁹ U.S. EPA, Draft New Source Review Workshop Manual. Prevention of Significant Deterioration and Nonattainment Area Permitting, U.S. EPA, Office of Air Quality, October 1990. Chapter D, Additional Impact Analyses.

Sinclair Wyoming Refining Company Crude Oil Optimization Project Transmitted of Construction Permit Application October 16, 2011, rev. 0

must be conducted if the sum of the PM₁₀, SO₂, and NO_X emission increases from the project, in tons per year (tpy) exceeds 10D, where D is the distance in kilometers from the source. A full Q/D analysis and request for determination of need for an analysis has been submitted by SWRC to WDEQ-AQD and was forwarded on to the appropriate Federal Land Managers (FLMs). It was determined, by all affected agencies, that no Class I AQRV impact will be required for this project.

5.1.4 WAQS&R Chapter 6, Section 2(c)(iv): (Location Standards)

The refinery is located in accordance with proper land use planning as determined by the State of Wyoming and Carbon County.

5.1.5 WAQS&R Chapter 6, Section 2(c)(v): (Best Available Control Technology (BACT) Evaluation)

This section of the WAQS&R requires the use of BACT with consideration of the economic reasonableness of reducing or climinating the emissions resulting from new or modified sources. BACT is defined in 40 CFR 52.21(b)(12) of the PSD regulations as "..an emission limitation based on the maximum degree of reduction for each pollutant subject to regulation under the Act which would be emitted from any...source...which on a case-by-case basis is determined to be achievable taking into account energy, environmental and economic impacts and other costs". For over 20 years it has been EPA's policy to require a "top-down" BACT analysis as described in EPA's October, 1990, Draft New Source Review Workshop Manual. Two key elements of a top-down analysis are that the most stringent control technologies must be considered, and a decision to require a lesser degree of emissions reduction must be based on an objective analysis of energy, environmental and economic impacts.

The five basic steps of a top-down BACT analysis are listed below:

Step 1: Identify potential control technologies

Step 2: Eliminate technically infeasible options

Step 3: Rank remaining control technologies by control effectiveness

Step 4: Evaluate the most effective controls and document results

Step 5: Select BACT

The first step is to identify potentially "available" control options for each emission unit triggering PSD, for each pollutant under review. Available options should consist of a comprehensive list of those technologies with a potentially

yoming Refining Company
——de Oil Optimization Project
Transmittal of Construction Permit Application
October 10, 2011, rev. 0

practical application to the emission unit in question. The list should include lowest achievable emission rate (LAER) technologies, innovative technologies, and controls applied to similar source categories. For this analysis, the following sources were relied upon:

- EPA's New Source Review Website,
- U.S. EPA's RACT/BACT/LAER Clearinghouse (RBLC) Database,
- Various state air quality regulations and websites,
- Recent EPA Consent decrees within the refining industry,
- Control Technology Vendors,
- Technical Books and Articles (as specified in the references to this document), and
- Guidance Documents.

After identifying potential technologies, the second step is to eliminate technically infeasible options from further consideration. To be considered feasible, a technology must be both available and applicable. It is important, in this step, that the technical basis for eliminating a technology from further consideration be clearly documented based on physical, chemical, engineering, and source-specific factors related to safe and successful use of the controls.

The third step is to rank the technologies not eliminated in Step 2 in order of descending control effectiveness for each pollutant of concern. If the highest ranked technology is proposed as BACT, it is not necessary to perform any further technical or economic evaluation. Potential adverse impacts, however, must still be identified and evaluated.

The fourth step entails an evaluation of energy, environmental, and economic impacts for determining a final level of control. The evaluation begins with the most stringent control option and continues until a technology under consideration cannot be eliminated based on adverse energy, environmental, or economic impacts. The economic or cost-effectiveness" analysis is conducted in a manner consistent with EPA's OAQPS Control Cost Manual Fifth Edition (EPA 1996) and subsequent revisions. An important aspect of the top-down BACT methodology is the establishment of baseline emission levels that are used in calculating the cost-effectiveness of alternative control options. EPA's Draft New Source Review Workshop Manual states that baseline emissions should be a

Sinclair Wyoming Refining Company Cride Oil Optimization Project Transmittal of Construction Permit Application October 10, 2011, rev. 0

realistic upper bound estimate of emissions taking into account physical or operational constraints and historical operating data.

The fifth and final step is to select as BACT the most effective of the remaining technologies under consideration for each pollutant of concern.

BACT considerations for SO₂, CO, VOC, and NO_X emissions from the proposed new and modified sources follow.

5.1.5.1 SO₂ Emissions

New and Modified Heaters

New and modified heaters will be fired with refinery fuel gas and/or purchased natural gas and is required to meet the fuel gas provisions of NSPS Subpart Ja (re: 40 CFR 60.102a) as described in Section 4.2.1 of this application.

SWRC proposes that incorporating the fuel gas H₂S concentration limits of NSPS Subparts J and Ja be accepted as BACT for SO₂ emissions from the new and modified heaters. Therefore no further control considerations are required.

Coker Unit Flare

The Coker Unit Flare is a control device currently equipped with a FGR system. Based upon discussions with state and federal agencies, industry contacts, air pollution control equipment vendors and review of the EPA web site, the use of FGR has been identified as BACT for refinery flares.

Additionally after this project, the Coker Unit flare gas will be required to meet the fuel gas provisions of NSPS Subpart Ja (re: 40 CFR 60.102a). SWRC proposes that incorporating the fuel gas H₂S concentration limits of NSPS Subparts Ja and use of FGR be accepted as BACT for SO₂ emissions from the Coker Unit Flare. Therefore no further control considerations are required.

New Emergency Air Compressor

SWRC proposes that incorporating the #2 Diesel fuel sulfur content limit of 500 ppmw and the operation of this emergency engine to no more than 500 hrs/yr be accepted as BACT for SO₂ emissions. Therefore no further control considerations are required.

5.1.5.2 CO Emissions

New and Modified Heaters

Based upon discussions with state and federal agencies, industry contacts, air pollution control equipment vendors and review of the EPA web site, the use of only gaseous fuels and good combustion practices has been identified as BACT for CO for the new and modified heaters.

CO emission increases resulting from the new and modified heaters also require the consideration of a BACT analysis. The heaters will lire refinery fuel gas and/or purchased natural gas to generate thermal energy necessary to indirectly heat process fluids. The heaters are inherently designed for complete combustion; this is accomplished by ensuring high combustion zone temperatures, sufficiently long residence times in the combustion zones and operating with excess oxygen. These are also the same combustion conditions necessary to minimize the formation of CO. Accordingly, SWRC proposes BACT for CO emissions from refinery fuel gas / purchased natural gas fired combustion sources is no additional control. SWRC proposes that use of good combustion practices to be accepted as BACT for CO emissions from the new and modified heaters. Therefore no further control considerations are required.

Coker Unit Flare

The Coker Unit Flare is a control device currently equipped with a FGR system. Based upon discussions with state and federal agencies, industry contacts, air pollution control equipment vendors and review of the EPA web site, the use of FGR has been identified as BACT for refinery flares. SWRC proposes that use of FGR be accepted as BACT for CO emissions from the Coker Unit Flare. Therefore no further control considerations are required.

New Emergency Air Compressor

The new emergency air compressor will be installed and operated to comply with the exhaust emission standards of 40 CFR Part 89.112 for Tier III engines and limited in operation to no more than 500 hrs/yr. SWRC proposes this as BACT for the emergency engine and therefore no further control considerations are required.

5.1.5.3 VOC Emissions

New and Modified Heaters

Based upon discussions with state and federal agencies, industry contacts, air pollution control equipment vendors and review of the EPA web site, the use of only gaseous fuels and good combustion practices has been identified as BACT for VOCs for the new and modified heaters.

VOC emission increases resulting from the new and modified heaters also require the consideration of a BACT analysis. The heaters will fire refinery fuel gas and/or purchased natural gas to generate thermal energy necessary to indirectly heat process fluids. The heaters are inherently designed for complete combustion;

Note the #1 Hydrogen Plant heater combusts both purchased natural gas and PSA gas while the #2 Hydrogen Plant heater combusts purchased natural gas, refinery fuel gas, and PSA gas.

Note the #1 Hydrogen Plant heater combusts both purchased natural gas and PSA gas while the #2 Hydrogen Plant heater combusts purchased natural gas, refinery fuel gas, and PSA gas.

Sinelair Wyoming Refining Company Crude Oil Optimization Project Transmittal of Construction Permit Application October 10, 2011, rev. 0

this is accomplished by ensuring high combustion zone temperatures, sufficiently long residence times in the combustion zones and operating with excess oxygen. These are also the same combustion conditions necessary to maximize the destruction of VOC. Accordingly, SWRC proposes that use of good combustion practices to be accepted as BACT for VOC emissions from the new and modified heaters. Therefore no further control considerations are required.

Coker Unit Flare

The Coker Unit Flare is a control device currently equipped with a FGR system. Based upon discussions with state and federal agencies, industry contacts, air pollution control equipment vendors and review of the EPA web site, the use of FGR has been identified as BACT for refinery flares. SWRC proposes that use of FGR be accepted as BACT for VOC emissions from the Coker Unit Flare. Therefore no further control considerations are required.

New Emergency Air Compressor

The new emergency air compressor will be installed and operated to comply with the exhaust emission standards of 40 CFR Part 89.112 for Tier III engines and limited in operation to no more than 500 hrs/yr. SWRC proposes this as BACT for the emergency engine and therefore no further control considerations are required.

New Fugitive Emission Sources

Assessment of VOC controls is required only for the new fugitive emissions from the project. Fugitive emissions, by definition, are those emissions which could not reasonably pass through a stack, chimney, vent, or other functionally equivalent opening. According to the New Source Review Workshop Manual, it is "unreasonable to expect that relatively small quantities of VOC emissions, caused by leaking valves at outside storage tanks...could be captured and vented to a stack." Therefore, the only control technology for fugitive valves is leak detection and repair.

The Refinery currently controls VOC fugitive component equipment leaks through a periodic leak detection and repair (LDAR) program. The approved leak detection and repair (LDAR) program is considered to be the Maximum Achievable Control Technology (MACT) under the Refinery MACT rule. Since MACT always equals or exceeds BACT, the LDAR program is selected as BACT at SWRC. In addition, regulatory guidance from states with a preponderance of the nation's refineries indicates the BACT for fugitive VOC emissions is an approved leak detection and repair program.

Sinclair Wyoming Refining Company Crude Oil Optimization Project Transmittal of Construction Permit Application October 10, 2011, rev. 0

5.1.5.4 NO_X Emissions

Coker Unit Flare

The Coker Unit Flare is a control device currently equipped with a FGR system. Based upon discussions with state and federal agencies, industry contacts, air pollution control equipment vendors and review of the EPA web site, the use of FGR has been identified as BACT for refinery flares. SWRC proposes that use of FGR be accepted as BACT for NOx emissions from the Coker Unit Flare. Therefore no further control considerations are required.

New Emergency Air Compressor

The new emergency air compressor will be installed and operated to comply with the exhaust emission standards of 40 CFR Part 89.112 for Tier III engines and limited in operation to no more than 500 brs/yr. Additionally SWRC will meet the NO_x emission limit requirements of 40 CFR Part 60 Subpart IIII for an emergency stationary internal combustion engine. SWRC proposes this as BACT for the emergency engine and therefore no further control considerations are required.

New and Modified Heaters

SWRC is providing an analysis of the technical feasibility and cost effectiveness of NO_X controls for the new and modified sources associated with this project. The following is a top-down BACT evaluation for these sources.

Identification of Candidate NO_X Control Technologies

The first step in a top-down analysis is to identify the available control options. Based upon discussions with state and federal agencies, industry contacts, air pollution control equipment vendors and review of the EPA web site, the following NO_X control technologies have been identified for consideration for the new and modified heaters. These technologies are also ranked according to performance starting at the most stringent control level.

- Selective Catalytic Reduction (SCR)
- Selective Non-Catalytic Reduction (SNCR)
- Ultra-Low NO_X Burners (ULNB)

In keeping with the top-down approach, the basic operation, technical feasibility, performance and advantages/disadvantages of the system that achieves the lowest emission rate will be discussed first. If proposed as BACT, the technical feasibility and associated impacts of the alternative controls will not be reviewed. If the lowest emitting scenario is not proposed as BACT, each subsequent control scenario will be evaluated starting at the next most stringent control level. BACT will be selected when a scenario cannot be dismissed due to technological, environmental, economic or energy related arguments.

Sinclair Wyoming Refining Company Crude Oil Optimization Project Transmittal of Construction Pennit Application October 10, 2011, rev. 0

Economic Impact – Cost Estimating Procedures

The cost estimating procedure used to evaluate the economic impact of alternative control technologies is described in this section.

Capital Costs

When available, actual installed cost data can be used to develop the Total Installed Capital Cost (TICC). If actual costs were not available, vendor supplied budgetary costs could be used. If neither is available, other cost estimating techniques are available. For this analysis, SWRC based the TICC for SCR on the estimation methodologies in the USEPA's Air Pollution Control Cost Manual - 6th Edition.

Annualized Costs

For this analysis, the annualized costs for capital equipment are based upon the Capital Recovery Cost (CRC) of the equipment. The CRC is the product of Capital Recovery Factor (CRF) multiplied by the TICC.

CRC - CRF x TICC

Where: CRF - X(1+X)*/(1+X)*-1

X - annual interest rate
n - equipment life

For all presented options, the CRF was based upon a 10 year equipment life and an average annual interest fraction of 0.1 which results in a CRF of 0.163.

The total annualized cost is the sum of the annualized CRC plus the annual operating costs for the equipment.

Cost Effectiveness

The economic impact incurred by the use of a pollution control alternative is measured as cost effectiveness. Cost effectiveness is the value obtained by dividing the annual tons of pollutant controlled into the annual cost. This results in a "dollar per ton" effectiveness value used in the cost effectiveness comparison.

5.1.5.4.1 New and Modified Heaters NO_X Control Cost Analysis

Comparison of NOx Control Technologies and Application to Candidate Source

Most Stringent Control Level

The most stringent level of control is SCR, as described above for all new and modified heaters. EPA documentation states that, where applicable, Selective Catalytic Reduction (SCR) offers the highest percent reductions

ming Refining Company Grace Oil Optimization Project Transmittal of Construction Permit Application October 10, 2011, rev. 0

of the available NO_x reduction techniques¹². The SCR process involves the mixing of anhydrous or aqueous ammonia vapor with flue gas and passing the mixture through a catalytic reactor to reduce NO_X to N₂. Under optimal conditions, SCR can have a removal efficiency greater than 90%, although typical reduction efficiencies are less than 90%.

The most important factor affecting SCR efficiency is temperature. SCR can operate in a flue gas window ranging from 500 °F to 1100 °F according to EPA literature 13, although the optimum range for SCR to be effective is 625 °F to 700 °F 14. Temperatures below the optimum decrease catalyst activity and allow NII3 to slip through; above the optimum range, ammonia will oxidize to form additional NO_x. SCR efficiency is also largely dependent on the stoichiometric molar ratio of NII3:NO_x; variation of the ideal 1:1 ratio to 0.5:1 ratio can reduce the removal efficiency to 50% 15.

Economic Impacts

The cost effectiveness calculation for installing a SCR unit on the new and modified heaters was based upon EPA's Air Pollution Cost Control Manual¹⁶. This analysis used EPA's "default" cost parameters and follows the example problem included in Section 2.5 of the manual with the following exceptions:

- The baseline or uncontrolled NO_x emission rate is defined as the existing burner, with its estimated emission rate in 1b NO_x/MMBtu.
- · A NO_x CEMS was also included in the direct capital cost.
- SCR catalyst cost of \$340/03 was obtained from a vendor supplied equipment quote for SCR installation (on the Fluid Catalytic Cracking Unit located at the SWRC).
- The cost of performance testing (initial and annual) was included.

Please refer to Appendix I for the cost effectiveness calculations. Table 5.1 - 5.6 summarize the cost effectiveness calculations for the SCR alternative for all new and modified heaters

¹² Alternative Control Techniques Document NO_X Emissions from Process Heaters (Revised), EPA-453/R-93-034.

¹³ EPA-453/R-93-034.

¹⁴ EPA-453/R-93-034 and Appendix.

¹⁵ EPA-453/R-93-034.

¹⁶ EPA Air Pollution Cost Control Manual, 6th ed, EPA 452/B-02-001, Section 4.2.

Table 5.1 Summary of Cost Effectiveness for SCR Alternative - 581 Crude Unit Heater

Direct Capital Cost (Equipment Cost)	\$4,983,538	
Total Capital Investment (Total Installed Capital Cost)	\$7,015,040	
Indirect Cost (Capital Recovery Cost)	\$1,141,665 per year	
Direct Annual Cost (Operating Cost)	\$213,666 per year	
Total Annual Cost (Capital Recovery Cost + Operating Cost)	\$1,355,331 per year	
NOx abated	20,4 tons per year	
Cost Effectiveness	\$66,403 per ton NOx abated	

Table 5.2 Summary of Cost Effectiveness for SCR Alternative 583 Vacuum Heater

Direct Capital Cost (Equipment Cost)	\$1,934,770	
Total Capital Investment (Total Installed Capital Cost)	\$2,723,441	
Indirect Cost (Capital Recovery Cost)	\$443,227	per year
Direct Annual Cost (Operating Cost)	\$84,318	per year
Total Annual Cost (Capital Recovery Cost + Operating Cost)	\$527,545	per <u>year</u>
NOx abated	5.6	tons per year
Cost Effectiveness	\$93,804	per ton NOx abated

Table 5.3 Summary of Cost Effectiveness for SCR Alternative -#1 HDS Heater

		<u> </u>
Direct Capital Cost (Equipment Cost)	\$2,200,609	
Total Capital Investment (Total Installed Capital Cost)	\$3,097,616	
Indirect Cost (Capital Recovery Cost)	\$504,123	per year
Direct Annual Cost (Operating Cost)	\$85,636	per year
Total Annual Cost (Capital Recovery Cost + Operating Cost)	\$589,758	per year
NOx abated	3.7	tons per year
Cost Effectiveness	\$161,255	per ton NOx abated

Table 5.4 Summary of Cost Effectiveness for SCR Alternative - Naphtha Splitter Heater

Dircet Capital Cost (Equipment Cost)	\$1,974,156	
Total Capital Investment (Total Installed Capital Cost)	\$2,778,874	
Indirect Cost (Capital Recovery Cost)	\$452,249	per year
Direct Annual Cost (Operating Cost)	\$77,169	per year
Total Annual Cost (Capital Recovery Cost + Operating Cost)	\$529,418	per year
NOx abated	5.1	tons per year
Cost Effectiveness	\$104,425	per ton NOx abated

Table 5.5 Summary of Cost Effectiveness for SCR Alternative – Hydrocracker II5 Heater

		<u>\</u>
Direct Capital Cost (Equipment Cost)	\$1,613,539	
Total Capital Investment (Total Installed Capital Cost)	\$2,271,269	
Indirect Cost (Capital Recovery Cost)	\$369,639	per year
Direct Annual Cost (Operating Cost)	\$65,450	per year
Total Annual Cost (Capital Recovery Cost + Operating Cost)	\$435,089	pçr year
NOx abated	4.9	tons per year
Cost Effectiveness	\$88,495	per ton NOx abated

Table 5.6 Summary of Cost Effectiveness for SCR Alternative - New BSI Heater

Direct Capital Cost (Equipment Cost)	\$1,706,602	
Total Capital Investment (Total Installed Capital Cost)	\$2,402,259	
Indirect Cost (Capital Recovery Cost)	\$390,957	per year
Direct Annual Cost (Operating Cost)	\$68,477	per year
Total Annual Cost (Capital Recovery Cost + Operating Cost)	\$459,434	per year
NOx abated	4.4	tons per year
Cost Effectiveness	\$104,894	per ton NOx abated

SWRC considers the cost effectiveness of the SCR alternative to be economically unreasonable. Therefore, the second most stringent control level will be considered.

Second Most Stringent Control Level

Selective Non-Calalytic Reduction (SNCR) is considered the second most stringent control level. SNCR is similar to SCR with the exception the ammonia is injected at a higher temperature (approximately 1,800°F) and a catalyst bed is not used to lower the activation energy of the reduction reaction. Typical NO_X reduction efficiencies range from 50% to 80% depending upon the residence time of the ammonia-flue gas mixture in the reaction temperature window.

If SNCR is applied to the candidate heaters, ammonia would be injected between the radiant heat transfer section and the convective heat transfer section. However, the flue gas temperature is not uniform across these flow regimes and the temperature continues to decrease rapidly through the downstream heat exchange zones. Both the temperature non-uniformity and the lack of residence time in the SNCR temperature window inhibit the reaction efficiency. In addition, if the temperature should exceed the desired temperature window, the ammonia will be oxidized to NO_X which will be counter-productive.

Because of the NO_X reduction performance uncertainty relating to the use of SNCR, SWRC discounts SNCR as technologically unsound for application with

ng Refining Company Crade Oil Optimization Project Transmittal of Construction Pennit Application October 10, 2011, rev. 0

the new and modified heaters. The third most stringent control level will be considered next.

Third Most Stringent Control Level

Ultra-Low NO_X burners are considered the third most stringent level of control. These burners employ fuel and/or air staging, and may use flue gas recirculation. Gas recirculation is achieved through either external routing or internal recirculation within the tlame envelope. Multiple combustion zones within the flame zone are employed. One typically operates under a fuel-rich condition and the other under a fuel-lean condition. The two zones are then mixed in a final burnout zone with low overall excess air to achieve NO_X reduction. Due to the use of fuel staging, air staging and flue gas recirculation, the burner flame envelope is significantly larger than for conventional burners.

SWRC utilizes Ultra-Low NOx burners in all of the modified heaters and also proposes to utilize Ultra-Low NOx burners in the new BSI Heater. Thus, SWRC is proposing the use of Ultra-Low NOx burners as BACT for NOx emissions from the new and modified heaters.

5.1.6 WAQS&R Chapter 6, Section 2(c)(vi): (Measurement of Emissions)

The refinery has provisions for measuring H₂S concentration in the refinery fuel gas which is fired in the new and existing heaters and boilers. The H₂S monitor was installed, certified and is maintained in accordance with Chapter 5, Section 2 of the WAQS&R. No new additional emissions monitoring is required for this project.

5.1.7 WAQS&R Chapter 6, Section 2(c)(vii): (Achievement of Performance Specified in Permit Application)

SWRC intends to comply with the performance specified in this application.

5.1.8 WAQS&R Chapter 6, Section 2(c)(viii): (Ambient Air Quality Standard Impact on Surrounding States)

As presented in Section 5.1.2, the facility will not adversely impact the WAAQS. Because the net emission increases resulting from this project are small and the facility is located close to the center of the state, the impact on surrounding states is considered minimal.

5.2 WAQS&R Chapter 6, Section 2(d): Use of Dispersion Techniques

No dispersion techniques or stack heights exceeding good engineering practice were used in the air dispersion modeling (Will be provided under separate cover).

5.3 WAQS&R Chapter 6, Section 3: Operating Permits

SWRC will submit to the Division a revision of its operating permit application incorporating provisions of this project within twelve months of commencing operation of the BSI Unit and associated modifications.

5.4 WAOS&R Chapter 6, Section 4: Prevention of Significant Deterioration

This section of the permit application addresses Prevention of Significant Deterioration (PSD) permitting requirements.

Per WAQS&R Chapter 6, Section 4, a petroleum refinery is a named facility. Because SWRC has the potential to emit regulated air pollutants in excess of 100 TPY, it is defined as a "Major Stationary Source". The facility is also located in a PSD (i.e. attainment) area for all pollutants. If a proposed increase in emissions from construction of a new source or modification of an existing source exceeds a PSD significance threshold, a PSD analysis is required.

For the initial test for PSD applicability, the emission increases from the project are compared to the PSD significance thresholds for each pollutant. Emission decreases are not evaluated at this stage. If the increase associated with the project is below the PSD significance threshold for a pollutant, PSD does not apply for that pollutant and no further analysis is required. If the PSD threshold is exceeded for one or more pollutants, the applicant may conduct a "netting analysis," which accounts for facility-wide emission increases and decreases of that pollutant over the five year contemporancous period.

Table 5.7 presents the emission increases from new, modified, and non-modified sources associated with the Crude Oil Optimization Project. This table is a summary of the emissions information presented in the Tables of Section 4. Table 5.7 also compares the emission increases to the PSD significance levels.

Table 5.7 Project Emissions and PSD Significance Test

Sources	PM Emissions TPY	PM ₁₀ Emissions TPY	PM _{2.5} Finissions TPY	SO₂ Emissions TPY	NO _x Emissions TPY	CO Emissions TPY	VOC Emissions TPY
Total New and Modified Sources	3.5	3.5	3.5	19.2	76.9	237.9	51.0
Total Non-Modified Sources	4.0	4,0	4.0	63.3	134.6	127.3	13.9
Total Project Emissions	7.5	7,5	7.5	82.5	211.5	365.2	65.0
PSD Significance Level	25	15	10	40	40	100	40
Exceed PSD Significance Level?	NO	NO	NO	YES	YES	YES	YES

Sinclair Wyoming Refining Company Create Oil Optimization Project Transmittel of Construction Permit Application October 10, 2011, rev. 0

As shown, the net emissions increases for PM/PM₁₀/PM_{2.5} are less than the respective PSD significance levels. Therefore, PSD does not apply for these pollutants and a notting analysis is not required. The net emissions increases for SO₂, NO_X, CO, and VOC are greater than the respective PSD significance levels. PSD regulations allow the use of a netting analysis to determine if a "significant net emission increase" will occur as a result of a project. SWRC has performed the netting analysis in accordance with procedures specified in the PSD rules. A six-step procedure is used for determining the net emissions change and is summarized below.

- Emission Increases From the Proposed Project Determine the emission increases from the proposed project. If increases are significant, proceed; if not, the project is not subject to PSD review.
- Contemporaneous Period Determine the beginning and ending dates of the contemporaneous period as it relates to the proposed project.
- 3. Emissions Increases and Decreases During the Contemporaneous Period Determine which emissions units at the facility experienced (or will experience, including any proposed decreases resulting from the proposed project) a creditable increase or decrease in emissions during the contemporaneous period.
- Creditable Emissions Changes Determine which contemporaneous emissions changes are creditable.
- Amount of the Emissions Increase and Decrease Determine, on a pollutant-by-pollutant basis, the amount of each contemporaneous and creditable emissions increase and decrease.
- PSD Review Sum all contemporaneous and creditable increases and decreases with the emissions changes from the proposed project to determine if a significant net emissions increase will occur.

In order to perform a netting analysis, the contemporaneous periods must be determined. The term "contemporaneous period" is defined in the PSD regulation as the period that includes the five (5) years prior to initiating construction on a proposed modification, and the period between the initiation of construction and the initiation of operation of the new or altered equipment. The estimated date for initiating the Crude Oil Optimization Project is June 1, 2012. For purposes of contemporaneous period definition, the initial operation is scheduled for June 1, 2012. Therefore, the contemporaneous period for this project runs from June 3, 2007 through June 1, 2012.

Contemporaneous and creditable emissions increases included in the PSD netting analysis are based on current facility permits. The following table summarizes the contemporaneous and creditable emissions increase/decrease included in the project PSD netting analysis. Detailed emissions estimates and netting analysis are provided in Appendix H.

Table 5.8 Project Emissions and PSD Significance Netting Analysis

Sources	SO ₂ Emissions TPY	NO _X Emissions TPY	CO Emissions TPY	VOC Emissions TPY
Total Project Emissions	82.5	211.5	365.2	64.9
Contemporançous Emissions	21.8	15.7	117.6	64.5
Total Net Emissions	104.2	227.2	482,8	129.5
PSD Significance Level	40	40	100	40
Exceed PSD Significance Level?	YES	YES	YES	YES

As shown in the previous table the Crude Oil Optimization Project triggers PSD significance for SO₂, NO_x, CO, and VOC. Therefore, a full PSD review is required for these pollutants as a result of the modifications proposed in this plan approval. The PSD review requirements are summarized below:

- Apply Best Available Control Technology (BACT) for regulated pollutants emitted above PSD thresholds for all emissions units (see previous discussion in Section 5.1.5 of this report);
- Assess the ambient impact of emissions through the use of dispersion modeling (To be provided under separate cover); and
- Conduct additional impact assessments that analyze impairment to visibility, soils, and vegetation as a result of the modification, as well as impacts on Class I areas (To be provided under separate cover).

5.5 WAQS&R Chapter 6, Section 5: Permit Requirements for Construction and Modification of NESHAP Sources

The information required in Chapter 6, Section 5(a)(iii)(A)(II) is provided below:

Paragraphs (1) through (3): See Section 2 of the permit application (i.e. WDEQ/AQD forms).

Paragraph (4): The relevant standard is:

- 40 CFR 63 Subpart DDDDD (see Section 8.1.1 of the permit application)
- 40 CFR 63 Subpart CC (see Section 8.1.2 of the permit application)

Sinclair Wyoming Refining Company Crude Oil Optimization Project Transmittal of Construction Permit Application October 10, 2011, rev. 0

Paragraph (5): The expected commencement date of construction/modification of this project is January 2012.

Paragraph (6): The expected construction/modification completion dates for the sources in this project are:

- 581 Crude Unit Heater: June 2012
- 583 Vacuum Unit Heater: June 2012
- #1 HDS Heater: June 2012
- Naphtha Splitter Heater: June 2012
- Hydrocracker Heater H5: June 2012
- BSI Heater: June 2013.
- BSI Product Tank: June 2013

Paragraph (7): The anticipated initial start-up dates of these sources in this project are:

- 581 Crude Unit Heater: June 2012
- 583 Vacuum Unit Heater: June 2012
- #1 HDS Heater: June 2012
- Naphtha Splitter Heater: June 2012
- Hydrocracker Heater H5: June 2012
- BSI Heater: July 2013
- BSI Product Tank: July 2013

Paragraph (8): The types and estimated quantity of HAPs emitted by the sources is provided in Appendix G of the permit application.

6.0 New Source Performance Standards: WAQS&R Chapter 5, Section 2

Chapter 5, Section 2 of the WAQS&R addresses performance standards for affected facilities which commenced construction, reconstruction or modification after the applicability date of the standard. The Applicability and non-applicability of these standards as relating to this project are discussed in this section.

6.1 New Source Performance Standards Applicable to this Project

6.1.1 WAQS&R Chapter 5, Section 2 – 40 CFR 60, Subpart Kb: Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction or Modification Commenced After July 23, 1984

The new storage tank will be subject to this rule because it will have a capacity greater than 151 cubic meters (949 bbl) and will store volatile organic liquid (VOL) with a vapor pressure greater than 5.2 kilopascals (kPa) (0.75 pounds per

Sinchric Wyoming Refining Company Crade Oil Optimization Project Fransmittal of Construction Permit Application October 10, 2011, rev. 0

square inch (psi) but less than 76.6 kPa (11.1 psi). The tank will be larger than 1,589.874 cubic meters (10,000 bbl), so the exemption at 40 CFR 60.110b(d)(4) for vessels used for petroleum prior to custody transfer does not apply.

The new tank will comply with the requirements of Subpart Kb by the use of an external floating roof tank that meets the requirements of Section 60.112b(a)(2). All other existing tanks currently subject to Subpart Kb will continue to meet the requirements of 40 CFR 60, Subpart Kb.

6.1.2 WAQS&R Chapter 5, Section 2 – 40 CFR 60, Subpart Ja: Standards of Performance for Petroleum Refineries

Fuel Gas Combustion Devices

This regulation is applicable to fuel gas combustion devices which commenced construction, modification or relocation after May 14, 2007. Therefore, the new and modified heaters and Coker Flare are required to meet the H₂S provisions of this Subpart (see Section 5.1.5.1). Note that the # 2 Hydrogen Plant, 583 Vacuum Heater, and the #11, #12, #13, and #14 Boilers are also required to meet the NSPS Ja standard. All other fuel gas combustion devices at the refinery are required to meet the fuel gas combustion device standards of WAQS&R Chapter 5, Section 2 – 40 CFR 60, Subpart J: Standards of Performance for Petroleum Refineries.

6.1.3 WAQS&R Chapter 5, Section 2 – 40 CFR 60 Subpart IIII: Standards of Performance for Stationary Compression Ignition Internal Combustion Engines

The new Emergency Air Compressor will be subject to the requirements for emergency stationary internal combustion engines under this subpart.

6.1.4 WAQS&R Chapter 5, Section 2 – 40 CFR 60, Subpart GGGa: Standards of Performance for Equipment Leaks of VOC in Petroleum Refineries for which Construction, Reconstruction, or Modification Commenced After November 7, 2006

All new piping components in existing units will be included in the refinery's LDAR program. All piping components in the new BSI Unit associated with this project will be subject to Subpart GGGa, and will be included in the refinery's LDAR program.

6.1.5 WAQS&R Chapter 5, Section 2-40 CFR 60, Subpart QQQ: Standards of Performance for VOC Emissions from Petroleum Refinery Wastewater Systems

The project may require the installation of new drains, but will not involve any other modifications to the wastewater system. Wastewater from the new BSI Unit will drain to the refinery's existing wastewater treatment system. The new drains

Sinclair Wyoming Refining Company Crude Oil Optimization Project Transmittal of Construction Permit Application Outsider 10, 2011, rev. 0

will be incorporated into the refinery's existing QQQ and BWON compliance management systems.

6.2 New Source Performance Standards Not Applicable to this Project

6.2.1 WAQS&R Chapter 5, Section 2 – 40 CFR 60 Subpart De: Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units

There are no steam generating units in this source category associated with this project. The new and modified heaters are process heaters as defined in this subpart, and therefore the requirements of Subpart Db do not apply.

6.2.2 WAQS&R Chapter 5, Section 2 – 40 CFR 60 Subpart Db: Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units

There are no new, reconstructed, or modified sources in this source category associated with this Project. Although several of the boilers at the refinery are in this category, no boilers will be modified or reconstructed. The #1 and #2 Hydrogen Plant heaters are process heaters, not steam generating units, and will also not be modified or reconstructed as part of the project.

6.2.3 WAQS&R Chapter 5, Section 2 – 40 CFR 60 Subpart J: Standards of Performance for Petroleum Refineries and 40 CFR 60 Subpart Ja: Standards of Performance for Petroleum Refineries

As noted above, the fuel gas combustion devices associated with the Crude Oil Optimization Project will be subject to the relevant sections of Subparts J and Ja. The other provisions of these subparts do not apply, as described below.

FCCU

There are no new or modified FCCUs associated with this project.

Claus Sulfur Recovery Plant (SRP)

There are no new or modified SRPs associated with this project. The existing SRPs at the relinery are subject to 40 CFR 60 Subpart J and are affected sources per 40 CFR 63 Subpart UUU (i.e. Refinery MACT 2).

6.2.4 WAQS&R Chapter 5, Section 2 – 40 CFR 60 Subpart 1: Standards of Performance for Hot Mix Asphalt Facilities

SWRC does not manufacture hot mix asphalt by heating and drying aggregate and mixing with asphalt cements per this standard. SWRC only manufactures asphalt cements. Therefore, SWRC is not an affected source under 40 CFR 60 Subpart I.

g Refining Company
Optimization Project
Transmittel of Construction Permit Application
October 10, 2011, rev. 0

6.2.5 WAQS&R Chapter 5, Section 2 - 40 CFR 60 Subpart GG: Standards of Performance for Stationary Gas Turbines

There are no stationary gas turbines associated with this project.

6.2.6 WAQS&R Chapter 5, Section 2 – 40 CFR 60 Subpart UU: Standards of Performance for Asphalt Processing and Asphalt Roofing Manufacture

SWRC does not process asphalt or manufacture asphalt roofing materials per this standard.

6.2.7 WAQS&R Chapter 5, Section 2 – 40 CFR 60 Subpart XX: Standards of Performance for Bulk Gasoline Terminals

This project does not have any XX sources associated with it. Note Subpart XX is not directly applicable to SWRC. However, certain provisions of 40 CFR 60 Subpart XX are incorporated by reference via SWRC's applicability to 40 CFR 63 Subpart CC.

6.2.8 WAQS&R Chapter 5, Section 2 – 40 CFR 60 Subpart III: Standards of Performance for Volatile Organic Compound (VOC) Emissions From the Synthetic Organic Chemical Manufacturing Industry (SOCMI Air Oxidization Processes)

There are no processes regulated by this standard associated with this project.

6.2.9 WAQS&R Chapter 5, Section 2 – 40 CFR 60 Subpart KKK: Standards of Performance for Equipment Leaks of VOC From Onshore Natural Gas Processing Plants

There are no processes regulated by this standard associated with this project.

6.2.10 WAQS&R Chapter 5, Section 2 – 40 CFR 60 Subpart LLL: Standards of Performance for Onshore Natural Gas Processing: SO₂ Emissions

Equipment associated with this project only process refinery fuel gas not natural gas per the definition in this rule. Therefore, the provisions of this rule do not apply to this project.

6.2.11 WAQS&R Chapter 5, Section 2 – 40 CFR 60 Subpart NNN: Standards of Performance for Volatile Organic Compound (VOC) Emissions From the Synthetic Organic Chemical Manufacturing Industry (SOCMI) Distillation Operations

There are no processes regulated by this standard associated with this project.

Sinclair Wyoming Refining Company Crade Oil Optimization Project Transmittal of Construction Permit Application October 10, 2011, rev. 0

6.2.12 WAQS&R Chapter 5, Section 2 – 40 CFR 60 Subpart RRR: Standards of Performance for Volatile Organic Compound Emissions From the Synthetic Organic Chemical Manufacturing Industry (SOCMI) Reactor Processes

There are no SOCMI reactor processes associated with this project. Therefore, the provisions of this rule do not apply to this project.

6.2.13 WAQS&R Chapter 5, Section 2 - 40 CFR 60.18(b): General Control Device Requirements (Flares)

There are no sources regulated by this standard associated with this project.

6.2.14 WAQS&R Chapter 5, Section 2 – 40 CFR 60, Subpart GGG: Standards of Performance for Equipment Leaks of VOC in Petroleum Refineries

The BSI Unit will commence construction after November 7, 2006. Therefore the new BSI Unit fugitive components will be subject to NSPS GGGa. The new fugitive emission components in existing units will not trigger NSPS reconstruction thresholds and will not be subject to NSPS GGGa.

7.0 40 CFR 61 (NESHAP)

This section addresses the national emissions standards for hazardous air pollutants. The applicability and non-applicability of these standards as relating to this project are discussed in this section.

7.1 NESHAP Standards Applicable to this Project

7.1.1 40 CFR 61 Subpart M: National Emission Standards for Asbestos

This project may involve the removal of asbestos, therefore the provisions of this standard apply to SWRC. SWRC has an ongoing program to manage asbestos in accordance with this standard.

7.1.2 40 CFR 61 Subpart FF: National Emission Standards for Benzene Waste Operations (BWON)

The provisions of this standard apply to SWRC. Streams from the new unit and associated modifications will be analyzed and included in the Refinery's BWON program as applicable.

7.2 NESHAP Standards Not Applicable to this Project

7.2.1 40 CFR 61 Subpart J: National Emission Standards for Equipment Leaks (Fugitive Emission Sources) of Benzene

The provisions of this subpart are not applicable because there are no streams in benzene service associated with this project.

7.2.2 40 CFR 61 Subpart V: National Emission Standards for Equipment Leaks (Fugitive Emission Sources)

The provisions of this subpart are not applicable because there are no streams in VHAP service associated with this project.

7.2.3 40 CFR 61 Subpart Y: National Emission Standards for Benzene Emissions from Benzene Storage Vessels

The provisions of this subpart are not applicable because there are no benzene storage vessels associated with this project.

7.2.4 40 CFR 61 Subpart BB: National Emission Standards for Benzene Emissions from Benzene Transfer Operations

The provisions of this subpart are not applicable because there are no benzene transfer operations associated with this project.

8.0 40 CFR 63 (MACT) WAQS&R Chapter 5, Section 3

Chapter 5, Section 3 of the WAQS&R addresses the national emissions standards for hazardous air pollutants for affected facilities. The applicability and non-applicability of these standards as relating to this project are discussed in this section.

8.1 MACT Standards Applicable to this Project

8.1.1 40 CFR 63 Subpart DDDDD - National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers and Process Heaters

40 CFR 63 Subpart DDDDD (Heater / Boiler MACT) is applicable to SWRC. On June 14, 2007, EPA vacated the Heater/Boiler MACT rule. However, the State of Wyoming adopted this rule by reference into the WAQS&R. Additionally, the EPA has since re-published and then delayed proposed new regulations for this Subpart. Therefore, this rule is applicable to the new and modified heaters at the state level, and the hydrogen plants and boilers are already subject to this subpart.

8.1.2 WAQS&R Chapter 5, Section 3 – 40 CFR 63 Subpart CC - National Emission Standards for Hazardous Air Pollutants From Petroleum Refineries

The storage vessel, equipment leak, miscellaneous process vent, gasoline loading rack and wastewater provisions of 40 CFR 63 Subpart CC are applicable to SWRC.

Some new fugitive components may be subject to the requirements of Subpart CC. These components will be incorporated into the refinery's LDAR program.

Wastewater streams associated with the project may also be subject to the Subpart CC standards. As applicable, these streams will comply with the applicable requirements of 40 CFR Part 60, Subpart QQQ and 40 CFR Part 61, Subpart FF.

The new BSI Product Tank will be a Group 1 storage vessel subject to the requirements of Subpart CC. The tank will be designed to comply with the requirements of 40 CFR Part 63 Subpart G, incorporated by reference.

There will be no new miscellaneous process vents associated with the proposed project.

8.1.3 WAQS&R Chapter 5, Section 3 – 40 CFR 63 Subpart ZZZZ. -National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines

A new or reconstructed emergency or limited use stationary RICE with a site rating of less than or equal to 500 brake HP located at a major source of HAP emissions must meet the requirements of this part by meeting the requirements of 40 CFR Part 60 Subpart IIII for compression ignition engines. As previously identified, the New Emergency Air Compressor will comply with the applicable provisions of 40 CFR Part 60 Subpart III for emergency stationary internal combustion engines. No further requirements apply for such engines under this part.

8.1.4 WAQS&R Chapter 5, Section 3 –40 CFR 63 Subpart GGGGG - National Emission Standards for Hazardous Air Pollutants: Site Remediation

40 CFR 63 Subpart GGGGG (Site Remediation MACT) is applicable to the refinery because site remediation is conducted. There is a potential for contaminated soils to be excavated in conjunction with this project but these activities are expected to be exempt from this subpart because 40 CFR 63.7881(b)(3) exempts site remediation performed under a Resource Conservation and Recovery Act (RCRA) corrective action. SWRC will follow

tefining Company
Crass On Optimization Project
Transmittal of Construction Permit Application
October 10, 2011, rev. 0

applicable requirements of the Site Remediation MACT for any remediation associated with this project that is not performed under a RCRA corrective action.

8.2 MACT Standards Not Applicable to this Project

8.2.1 WAQS&R Chapter 5, Section 3 – 40 CFR 63 Subpart F - National Emission Standards for Organic Hazardous Air Pollutants From the Synthetic Organic Chemical Manufacturing Industry

40 CFR 63 Subpart F is not applicable to SWRC.

8.2.2 WAQS&R Chapter 5, Section 3 – 40 CFR 63 Subpart G - National Emission Standards for Organic Hazardous Air Pollutants From the Synthetic Organic Chemical Manufacturing Industry for Process Vents, Storage Vessels, Transfer Operations, and Wastewater

40 CFR 63 Subpart G is not directly applicable to project. However portions of 40 CFR 63 Subpart G, as incorporated by reference via 40 CFR 63 Subpart CC, are applicable to SWRC.

8.2.3 WAQS&R Chapter 5, Section 3 – 40 CFR 63 Subpart II - National Emission Standards for Organic Hazardous Air Pollutants for Equipment Leaks

40 CFR 63 Subpart II is not applicable to this project. Equipment leak provisions for this project and SWRC are incorporated by NSPS and MACT Subpart CC.

8.2.4 WAQS&R Chapter 5, Section 3 – 40 CFR 63 Subpart Q - National Emission Standards for Hazardous Air Pollutants for Industrial Process Cooling Towers

40 CFR 63 Subpart Q is not applicable to the SWRC because SWRC does not use chromium based water treatment chemicals.

8.2.5 WAQS&R Chapter 5, Section 3 – 40 CFR 63 Subpart R - National Emission Standards for Gasoline Distribution Facilities (Bulk Gasoline Terminals and Pipeline Breakout Stations)

40 CFR 63 Subpart R is not directly applicable to this project. However portions of 40 CFR 63 Subpart R, as incorporated by reference via 40 CFR 63 Subpart CC, are applicable to SWRC.

Sinclair Wyoming Reliting Company Crude Oil Optimization Project Transmittal of Construction Pennit Application October 10, 2011, rev. 0

8.2.6 40 CFR 63 Subpart LLLLL - National Emission Standards for Hazardous Air Pollutants: Asphalt Processing and Asphalt Roofing Manufacturing

40 CFR 63 Subpart LLLLI. (Asphalt Processing MACT) is not applicable to SWRC because this facility is not engaged in the preparation of asphalt flux as defined in 40 CFR 63.8698.

8.2.7 WAQS&R Chapter 5, Section 3 – 40 CFR 63 Subpart UUU - National Emission Standards for Hazardous Air Pollutants for Petroleum Refineries: Catalytic Cracking Units, Catalytic Reforming Units, and Sulfur Recovery Units

The FCCU regenerator vent, catalytic reforming unit vent and sulfur recovery unit vent provisions of 40 CFR 63 Subpart UUU are currently applicable to SWRC. There are no new affected Subpart UUU sources associated with this project.

8.2.8 WAQS&R Chapter 5, Section 3 – 40 CFR 63 Subpart EEEE - National Emission Standards for Hazardous Air Pollutants: Organic Liquids Distribution (Non-Gasoline)

There are no Organic Liquid Distribution affected sources at SWRC or associated with this project. Therefore 40 CFR 63 Subpart EEEE is not applicable to SWRC.

9.0 40 CFR 64 - Compliance Assurance Monitoring (CAM) for Major Stationary Sources

This project has no CAM applicable sources associated with it.

10.0 40 CFR 68 - Chemical Accident Prevention Provisions

The chemical accident prevention provisions are applicable to SWRC. SWRC will include any necessary changes to its Risk Management Plan (RMP) in conjunction with this project.

11.0 40 CFR 82 - Protection of Stratospheric Ozone

The provisions of 40 CFR 82 are applicable to SWRC. SWRC uses licensed contractors to perform maintenance on equipment with Ozone depleting substances in accordance with this standard.

Sinclair Wyoming Refining Company timization Project emit Application October 10, 2011, rev. 0

APPENDICES

Sinclair Wyoming Refining Company Crude Oil Optimization Project Transmittal of Construction Permit Application October 10, 2011, rev. 0

Appendix A - SO₂ Emission Calculations

Appendix A SO2 Emissions Calculations

Fuel Gas Fired Heaters:

Assume (nat. gas):	4	ppmv = H2S content of purchased natural gas
	1000	Blu/scf ≈ Natural Gas Heat Content
Assume (J fuel gas):	162	ppiny = H2S content of fuel gas (3-hr)
, , ,	1160	Big/scf = Estimated Fuel Gas Heat Content (HHV)
Assume (Ja fuel gas):	60	ppmv = H2S content of fuel gas (annual)
, -	1160	Stu/scl = Estimated Fuel Gas Heat Content (HHV)
Assume (PSA gas):	6.1	ppmy = H2S content of PSA gas
, , ,	246	Btu/scf = PSA Gas Heat Content
Calculation:	SO2 Emissions = (_Btt#hr) x (sc#1160 8tu) x (_ppmv H2S#1000000) x (64 lb SO2)#(379.6 ft3#b mol)

:		Too a	\$02 (P	roposed)
Operating	Emission	Firing Hate		
Unit	Source	(MM8ttufir)	8b/hr	TPY
Coker	Coker Healer	145.0	3.4	5.5
BSI	BSI Heater	50.0	0.4	1.9
#2 H2 Plant	#2 H2 Plant Heater	288.0	1.3	5.6
581 Crude Unil	581 Crude Heater	233.0	5.5	8.9
583 Vacuum Unit	583 Vacuum Heater	64.2	1.5	2.5
Hydrocracker	Heater H1/3+2	38.0	0.9	1.5
	Heater H3	56.0	1.3	2.1
Ī	Heater H4	57.0	1.3	2.2
	Heater H5	44.9	1.1	1.7
780 FCCU	780 FCC Heater B3	10.0	0.2	0.4
Ī	780 FCC Hoafer H2	19.4	0.5	0.7
#1 HDS	#1HDS Heater	33.4	8.0	1.3
781 Reformer	Naghtha Spillter Heater	46.3	1.1	1.8
Ī	LEF Heater	24.0	0.6	0.9
Ī	#1 Reformer Heater	44.6	1.1	1.7
ľ	#2 Reformer Heater	74.8	1.8	2.9
[#3 Reformer Heater	22.4	0.5	0.9
ſ	Stabilizer Heater	11.1	0.3	0.4
#4 HDS	H2 Heater (25-H1'-101)	22.0	0.5	8.0
	H2 Heater (25-HT-102)	24.0	0.6	0.9
Coker	Coker Unit flare	100.0	2.4	3.8
#1 H2 Plant	#1 H2 Plant Heater	288.0	0.1	0.5
Asphall Loading	Asphalt Heater #1	8.0	0.2	0.3
#2 HDS	Charge Heater	28.0	0.7	1.1
#3 HDS	Charge Heater	18.0	0.4	0.7
l'otal			28.3	50.9

SRP

Combined Emissions from #1, #2 and #3 TGTU

Permit MD-1381A2

250 ppm SO2 (dry, 9% O2), NSPS Subpart J

Basis:

32.2 lb/hr SO2 emissions

Calculation:

84.6 TPY SO2 emissions

		SO2 (Proposed)	
Operating	Emission	[
Uภโt	Source	tb/hr	TPY
#1,#2,#3,#4 SRU	#1,#3,#4 TGTU	32.2	84.6

FCCU

Basis:

24,9 ppm SO2 (dry, 0% O2, annual average) 50.0 ppm SO2 (dry, 0% O2, 7-day average)

	[SO2 (Proposed)	
Operating	Emission		
Unit	Source	Hy/Inc	TPY
780 FCCU	780 FCCU Regenerator	26.5	57.8

LOLR

SO2 increase from Light Oil Loading Rack / Flare

Emissions are deminimis - only sweetened fuels are dispensed

New Emergency Air Compressor

Hours of operation:

500 hrs/year

20.8 days/year

802

0.353 fb/HP-hr

500 ppm S in #2 Dieset

	Calculation:	SO2 Emissions = (8HP) x (Ы́НР-hr) <u>х (5</u> і	00/1000000)	x (64 lb SO2	/32 lb-S)
ĺ			Engine	S	02	
	Operating Unit	Emission Source	Power (8HP)	ib/hr	TPY	
	Boilerhouse	New Emergency Air Compressor	400	0.1	<0.1	

Note: 1

Emission factors from 40 CFR Part 89.112 for Tier III engines

mag coffining Company Dil Optimization Project Transmittal of Construction Permit Application October 10, 2011, rev. 0

Appendix B - NO_X Emission Calculations

Appendix B NOx Emissions Calculations

New Reaters with Low NOx Burners: 36 NOWMON de ≅mission Factor 0.030 Existing Heaters with Low NOx Burners: ib NOx/MM 8kg Emission Factor 0.035H2 Plant with Low NOx Burners: Emission Factor 0,065 Rb NOx/MM Blu SRU Incinerator Emissions Factor Emission Factor 0.07 85 NOx/MM Stu AP - 42 Emission Factor for Cat Ox ib NOx/MM Sto Emission Factor 0.098AP - 42 Emission Factor for Flares (Table 13.5-1) ib NOx/MM Blu Emission Factor

SCR Pedermance		
90% reduction	0.100	
Existing WAQS&R G	as Fired Heate	18
Emission Factor	0.23	th NOx/MM 8ks
MD-976 NOx Factor		
Emission Factor	0.04	th NOx/MM Sta
New WAQS&R Gas (Fired I teaters	
Emission Factor	0,20	ib NOx/MM 8kg
HC Unit Heaters		
Emission Factor	0.07	3h NOx/MM 8ks
Coker Heater Factor		
Emission Factor	0,033	th NOx/MM Blue

Calculation:	NOx Emissions = (_MMSto/te}x{	_Rt NOx/MMBEU)
	1		

i				NOx (Pro	oosed)
Operating	Emission	Firing Rate	Emission Factor		
Uržt	Source	(MMSturht)	ib NOx/MM Blu	abdhr	ŢPY
Caker	Coker Heater	145.0	0.033	4.8	21.0
BSI	BSI Heater	50.0	0.030	1.5	6.6
#2 H2 Plant	#2 H2 Plant Heater	288.0	0.0100	2,9	12.6
581 Crude Unit	581 Crude Heater	233.0	0.030	7.0	30.8
583 Vacuum Unit	583 Vacuum Heater	64.2	0.030	1.9	8.4
Hydrocracker	Heater H1/H2	38.0	0.035	1.3	5.8
	Heater H3	56.0	0.035	2.0	8.6
Γ	Heater H4	57.0	0.035	2.0	8.7
Γ	Heater H5	44.9	0.035	1.6	6.9
780 FCCU	780 FCC Heater B3	10.0	0.230	2.3	10.1
l i	780 FCC Heater H2	19.4	0.230	4.5	19.5
#1 HDS	#1HDS Heater	33.4	0.035	1.2	5.1
781 Reformer	Neohina Splitter Heater	45.3	0,035	1.6	7.1
Г	LEF Heater	24.0	0.035	0.8	3.7
ľ	#1 Reformer Heates	44.6	0.035	1.6	6.8
Γ	#2 Reformer Heater	74.8	0.035	2.6	11.5
	#3 Reformer Heater	22.4	0.035	0.8	3.4
	Stabilizer Heater	11.1	0.035	0.4	1.7
#4 HDS	H2 Heater (25-HT-101)	22.0	0,035	0.8	3.4
	H2 Heater (25-HT-102)	24.0	0.035	0.8	3.7
Çoker	Coker Unit Bare	f00.0	0.66B	6.8	29.8
#1 H2 Plant	#1 It2 Plant Heater	288.0	0.685	18.7	82.0
Asphall Loading	Asphalt Heater#1	8.0	0.230	1.8	8.1
#21108	Charge Heater	28.0	0.035	1.0	4.3
#3 HOS	Charge Heater	18.0	0.035	0.6	2.8
Total				71,3	312.1

SRP

Combined Emissions from #1, #2 and #3 TGTU

Permit MD-1381A2

8asis

30.0 MM Btu/hr 0.07 % NOx / MM 8tu

Calculation:

lishe NOx = (30.0 MM Bluthr) x (0.07 to NOx/MM Blu)

		NOx (Prope	
Operating	Entission		
Unit	Sourco	lb/hr	TPY
#1,#2,#3,#4 SRU	#1,#3,#4 TGTU	2.1	9.2

FCCU

Basis:

40.0 ppm NOx (dry, 8% O2, annual average) 80.0 ppm NOx (dry, 8% O2, 7-day average)

		NOx (Proposed)	
Operating	Emission		
Unit	Source	lb/hr	TPY
780 FCCU	780 FCCU Regenerator	30.5	66.6

LOLR

NOx increase from Light Oil Loading Rack / Flare

Basis:

Facility Throughput:	М дру
Gasoline	 50000

Emission Factor Emission Factor 4.0 mg NOx/i 0.0334 fb NOx/M gal Source: John Zink estimate Source: John Zink estimate

Assume:

Heat release from the combustion of distillate fuel oil is deminimis

Calculation:

NOx Emissions = (____gal/hr)/(____ lb NOx/M gal)

		NOx		
Operating	Emission			
Unit	Source	lb/hr	TPY	
Light Oil Loading	Loading Rack Flare	0.19	0.8	

New Emergency Air Compressor

Hours of operation:

500 hrs/year 20.8 days/year

NOx

Calculation:	NOx Emissions = (BHP)x(g/BHP)			
		Engine	Emission Factor	NOx	
Operating	Emission	Power	(g/BHP-hr)		
Unit	Source	(BHP)	(Note: 1)	ib/inr	TPY
	New Emergency Air				:
Boilerhouse	Compressor	400	3.0	2.65	0.66

Note: 1

Emission factors from 40 CFR Part 89.112 for Tier III engines

SBG/sbg

Sinclair Wyoming Refining Company Crude Oif Optimization Project Transmittal of Construction Permit Application October 10, 2011, rev. 0

Appendix C-PM/PM₁₀/PM_{2.5} Emission Calculations

Appendix C Particulate Matter Emissions Calculations

= ,	1005	Cae	Fired	Hear	are-
mı	101	1.788	THE OR	Hea:	ers

Basis:

1.9

0.0019

Ib-PM / MMscf (AP-42, 5th Edition, Table 1.4-2, Filterable PM)
Ib-PM / MM Bitt, 1020 Bits/scf (AP-42, 5th Edition, Table 1.4-2)

Calculation:

PM Emissions = (____ MM8tu/hr)x(____ tb PM/MM8tu)

			PM (Propo) (besc
Operating Unit	Emission Source	Firing Rate (MMBtu/hr)	lb/hr	TPY
Coker	Coker Heater	145.0	0,3	1.2
BSI	BSI Heater	50.0	<0.1	0.4
#2 H2 Plant	#2 H2 Plant Heater	288.0	0.5	2.3
581 Crude Unit	581 Crude Heater	233	0.4	1.9
583 Vacuum Unit	583 Vacuum Heater	64.2	0.1	0.5
Hydrocracker	Heater H1/H2	38	<0.1	0.3
	Heater H3	58	0.1	Q. 5
	Heater H4	57	0.1	0.5
Hydrocracker	Heater H5	44.9	<0.1	0.4
780 FCCU	780 FCC Heater B3	10	<0.1	<0.1
	780 FCC Heater H2	19.4	<0.1	0,2
#1 HD\$	#1HDS Heater	33.4	<0.1	0.3
781 Reformer	Naphtha Splitter Heater	46.3	<0.1	0.4
	LEF Healer	24.0	<0.1	0.2
	#1 Reformer Heater	44.6	<0.1	0.4
	#2 Reformer Heater	74.8	0.1	0.6
	#3 Reformer Heater	22.4	<0.1	0.2
	Stabilizer Heater	11.1	<0.1	<0.1
#4 HDS	H2 Heater (25-HT-101)	22.0	¨ <0.1	0.2
	H2 Heater (25-HT-102)	24.0	<0.1	0,2
Coker	Coker Unit flare	100.0	0.2	8.0
#1 H2 Plant	#1 H2 Plant Heater	288.0	0.5	2.3
Asphalt Loading	Asphalt Heater #1	8.0	<0.1	<0.1
#2 HDS	Charge Heater	28.0	<0.1	0.2
#3 HDS	Charge Heater	18.0	<0.1	0.1
Total			3.3	14.3

SRP

Combined Emissions from #1, #2 and #3 TGTU

Proposed maximum emission rates:

Başiş:

30.0 MM Btu/hr 0.0019 lb PM / MM 8tu

Calculation:

Ib/hr PM = (13.2 MM Bt@hr) x (0.0019 lb PM/MM Btu)

		PM (Pr	oposed)
Operating	Emission	[ladla-	TPV
Unit	Source	Eb/hjr	
#1,#2,#3,#4 SRU	#1.#3.#4 TGTU	0.056	0.24

FCCU

Basis:

0.9 tb PM / 1000 lb coke burn (NSPS Subpart J)

17877.2 fb / hr coke burn

Calculation:

1b/hr PM = (

lb / hr coke burn) x (_

ke burn) x (_	lb PM / 1000 lb coke burn	ì
	PM (Proposed)	
#	<u> </u>	

		PM (Proposed)	
Operating	Emission		
Unit	Source	lb/hr	TPY
	760 FCCU Regenerator	16.1	70.5

PM = non sulfate particulate matter per EPA reference method 5F

LOLR

Contemporaneous PM increase from Light Oil Loading Rack / Flare

Emissions are deminimis - LOLR flare is required to be smokeless

New Emergency Air Compressor

Hours of operation:

500 hrs/year

20.8 days/year

PΜ

Calculation:

PM Emissions = (BHPlx(a/BHP)

Oziotizion.		Engine	Emission Factor	P	М
Operating	Emission	Power	(g/BHP-hr)		
Unit	Source	(BHP)	(Note: 1)	lb/hr	TPY
	New Emergency Air				
Boilerhouse	Compressor	400	0.15	0.13	0.03

Note: 1

Emission factors from 40 CFR Part 89.112 for Tier III engines

SBG/sbg

Sinclair Wyoming Refining Company Crude Oil Optimization Project Transmittal of Construction Permit Application October 10, 2011, rev. 0

Appendix D - CO Emission Calculations

Appendix D CO Emissions Calculations

Fuel Gas Fired Heaters:

Basis:

Existing Heaters with Conventional / Low NOx Burners

84

lb-CO / MMscf (AP-42, 5th Edition, Table 1.4-1)

0.082

(b-CO / MM Biu, 1020 Btu/scf (AP-42, 5th Edition, Table 1.4-1)

Heaters with Low NOx Burner Retrofits / New Heaters

0.040

tb-CO / MM Blu (Burner Vendor Estimate)

#2 H2 Plant

0.020

tb-CO / MM Btu (Burner Vendor Estimate)

Flares

0.370

tb-CO / MM Btu (AP-42 Table 13.5-1)

Then:

CO emissions = (____MMBtu/hr) x (____ib-CO / MM Btu)

				CO (Est	imated)
Operating Unit	Emission Source	Firing Rate (MMBtu/hr)	Emission Factor Ib CO/MM Stu	lb/hr	TPY
Coker	Coker Heater	145.0	0.040	5.8	25.4
BSI	BSI Heater	50.0	0.040	2.0	8.8
#2 H2 Plant	#2 H2 Plant Heafer	288.0	0.020	5.8	25.2
581 Crude Unit	581 Crude Heater	233.0	0.040	9.3	40.8
583 Vacuum Unit	583 Vacuum Heater	64.2	0.040	2.6	11,2
Hydrocracker	Healer H1/H2	36.0	0.040	1.5	6.7
	Heater H3	56.0	0.040	2.2	9.8
	Heater H4	57.0	0.040	2.3	10.0
Hydrocracker	Heater H5	44.9	0.040	1.8	7.9
780 FCCU	780 FCC Heater B3	10.0	0.082	0.8	3.6
	780 FCC Heater H2	19.4	0.082	1.6	7.0
#1 HDS	#1HDS Heater	33.4	0.040	1.3	5.9
781 Reformer	Naphtha Splitter Heater	46.3	0.040	1.9	8.1
	LEF Heater	24.0	0.040	1.0	4.2
	#1 Reformer Heater	44.6	0.040	1.8	7.8
	#2 Reformer Heater	74.8	0.040	3.0	13.1
	#3 Reformer Heater	22.4	0.040	0.9	3.9
	Stabilizer Heater	11.1	0.040	0.4	1.9
#4 HDS	H2 Heater (25-HT-101)	22.0	0.040	0.9	3,9
	H2 Heater (25-HT-102)	24.0	0.040	1.0	4.2
Coker	Coker Unit flare	100.0	0.370	37.0	162.1
#1 H2 Plant	#1 H2 Plant Heater	288.0	0.082	23.7	103.9
Asphalt Loading	Asphall Heater #1	6.8	0.082	0.7	2.9
#2 HDS	Charge Heater	28.0	0.040	1.1	4.9
#3 HD\$	Charge Heater	18.0	0.040	0.7	3.2
Total				111.0	486.3

SRP

Combined Emissions from #1, #2 and #3 TGTU

30.0 MM Btu/hr

0.300 |b-CO / MM Btu (Ortloff Estimate)

Then:

CO emissions = (____MMBlu/hr) x (0.082 lb-CO / MM Blu)

		CO	Estimated)
Operaling	Emission		
Unit	Source	1pt/st	TPY
#1,#2,#3,#4 SRU	#1,#3,#4 TGTU		9.0 39.4

FCCU

Basis:

500.0 ppm CO (dry, 6% O2, hourly average)

		CO (Estimated)		
Operating	Emission			
Unit	Source	lb/hr	TPY	
780 FCCU	780 FCCU Regenerator	115.1	504.0	

LOLR

Contemporaneous CO increase from Light Oil Loading Rack / Flare

Basis:

Facility Throughput:	М дру
Gasoline	50000

Emission Factor

10.0 mg CO/l

Source: John Zink estimate

Emission Factor

0.0834 lb CO/M gal

Source: John Zink estimate

Assume:

Heat release from the combustion of distillate fuel oil is deminimis

Calculation:

CO Emissions = (___ gal/hr)/(___ lb CO/M gal)

			CO
Operaling Unit	Emission Source	lb/hr	TPY
Light Oil Loading	Loading Rack Flare	0.5	2.09

New Emergency Air Compressor Hours of operation:

500 hrs/year 20.8 days/year

CO

Calculation:	CO Emissions = (BHP)x(g/BHP)			
		Engine	Emission Factor	CO (Est	lmated)
Operating	Emission	Power	(g/BHP-hr)		
Unit	Source	(BHP)	(Note: 1)	tb/hr	TPY
	New Emergency Air				
Boilerhouse	Compressor	400	2.60	2,29	0.57

Note: 1

Emission factors from 40 CFR Part 89.112 for Tier III engines

SBG/sbg

Sinclair Wyoming Refining Company Crade Oil Optimization Project Transmittal of Construction Permit Application October 10, 2011, rev. 0

Appendix E - VOC Emission Calculations

Sardak Wyoming Refining Company Crude Oil Optimization Project Transmittat of Construction Pernal Application Cictober 10, 2011, rev. 0

Appendix E **VOC Emissions Calculations**

Fuel Gas Fired Heaters:

Basis: Heaters:

5.5

ib-VOC / MMscf (AP-42, 5th Edition, Table 1.4-2)

0.0054

fb-VOC / MM Btu, 1020 Btu/scf. (AP-42, 5th Edition, Table 1.4-2)

Flares

0.063

tb-CO / MM 8(u (AP-42 Table 13.5-1 and 13.5-2)

Then:

VOC emissions = (____MMBtu/hr) x (____fb-VOC / MM B(u)

			VOC (Esti	mated)
Operating	Emission	Firing Rate	•	
Unit	Source	(MMB(whr)	Pb/fir	TPY
Coker	Coker Heater	145.0	0.8	3.4
BSI	BSI Heater	50.0	0.3	1.2
#2 H2 Plant	#2 H2 Plant Heater	288.0	1.6	8.0
581 Grude Unit	581 Crude Heater	233	1.3	5.5
689 Vacuum Unit	583 Vacuum Heater	64.2	0.3	1,5
Hydrocracker	Heater H1/H2	38	0.2	0,9
	Hoater H3	56	0.3	1,3
	Hoater H4	57	0.3	1.3
Hydrocracker .	i-leater H5	44.9	0,2	1.1
780 FCCU	780 FCC Heater B3	10	<0.1	0.2
	780 FCC Heater H2	19.4	0,1	0.5
#! HOS	#1HOS Reater	33.4	0.2	0.8
78t Reformer	Naphtha Spiilter Heater	46.3	0.2	1.1
	LEF Heater	24.0	0.1	0.6
	#1 Reformer Heater	44.6	0.2	1.1
	#2 Retorner Heater	74.8	0.4	1.8
	#3 Reformer Heater	22.4	Q.1	0.5
	Stabilizer Heater	11.1	<0.1	0.3
#4 HD\$	H2 Heater (25-HT-101)	22.0	G .1	0.5
L i	H2 Heater (25-HT-102)	24.0	6.1	0.6
Coker	Coker Unit flare	100.0	6.3	27.6
#1 H2 Plant	#1 H2 Plant Heater	288.0	1.6	6.8
Asphall Loading	Asphall Heater #1	8.0	<0.1	0.2
#2 HDS	Charge Healer	28.0	0.2	0.7
#3 HOS	Cherge Heater	18.0	<0.1	0.4
Tolal			15.2	66.6

SRP

Combined Emissions from #1, #2 and #3 TGTU

30.0 MM Stufer

5.5 lb-VOC / MMscf (AP-42, 5th Edition, Table 1.4-2) 0.0054 lb-VOC / MM Btu, 1020 Btu/scf (AP-42, 5th Edition, Table 1.4-2)

Then:

VOC emissions = (____ MMBtu/hr) x (0.0054 lb-VOC / MM Btu)

		VOC (Estimated)	
Operating	Emission		
Unit	Source	lb/hr	ŢPY
#1,#2,#3,#4 SRU	#1,#3,#4 TGTU	0.16	0.71

FCCU

Basis:

\$.3 lb/far (Average of 2006 and 2009) 23.3 tpy (Average of 2006 and 2009)

162	[CQ.(Estimated)
Operating Unit	Enyission Sovros	lb/hr	TPY
780 FCCU	780 FCCU Regenerator	5.3	23.3

LOLR

Contemporaneous VOC Increase from Light Oit Loading Rack / Flare

Basis:

Facility Throughput:	М дру
Gasoline	50000
Distillate Fuol Oil	250000
Total	300000

Assumo:

Total Organic Compounds (TOC) = Volatile Organic compounds (VOC)

Gasoline Loading (controlleti)

Emission Factor

Emission Factor

10.0 and TOCA 0.0834 lb TOC/M gail Source: 40 CFR 63,422 Source: 40 CFR 63,422

Calculation:

TOC Emissions ≃ (___ gal. gasoline /hr)/(____ Ib TOC/M gal.) 0.5 Pb TOCAir

Distillate Fuct Oil Loading (controlled)

Loading Losses (lb/1000 gat) = (12.46)(S)(P)(M)/T)

Source: AP-42, 5th ed., Section 5.2, equation 1

Where:

S = saturation factor P = True Vapor Prossure

M = Molecular Weight of Vapor T = Liquid Temperature

130 507.3 deg. R 98.0 %

0.0042 psia

Catculation:

E = Control Efficiency VOC Emissions = E*(____gal, distillate fuci oil / hr)(12.46)(S)(P)(M)/T)

0.008 lb VOC/ar

Combined Emissions (Gasoline + Distillate Fuel Oil Loading)

0.5 lb / lvr

·· <u>^</u>	<u>''', </u>	VOC (Estimated)		
Operating Unit	Emission Source	lb/far	'tPY	
Light Oil Loading	Loading Rack Flare	0.5	2.12	

Storage Tanks

	Re: Janks 4.0		*******
		VOC	(Estimated)
Oposaling Unit	Ergission Source	lb/hr	TPY
New Sources		110,00	
Tank Form	100 M bbi teek	34,2	7.8

Re; Tanka 4.0

	<u>"dl-</u>	VOC	(Estimated)			
Operating	Emission					
Unit	Source	Ho/fer	TPY			
incremental increase it	Incremental Increase in Existing Storage Tanks					
	Existing Storage Tenks	2.9	0.7			

New Emergency Air Compressor Hours of operation:

500 hrs/year 20.8 days/year

VOC

Calculation:	VOC Emissions = (Bi iP)x(g/BHP)			
		Engine	Emission Factor	VOC (Es	
Operating	Emission	Power	(g/BHP-hr)		l"
Unit	Source	(0HP)	(Note: 2)	Ebéhe	TPY :
1	New Emergency Air	ğ		£"	
Roilerhouse -	Compressor	400	1.00	0.88	0.22

Note: 2

Assume HC omission factor from 40 CFR Part 89.112 for Tier I engines

SBG/sbg

Sinclair Wyoming Refining Company Cinde Oil Optimization Project Transmittal of Construction Permit Application Outober 10, 2011, rev. 0

Appendix F - Fugitive Emission Calculations

Sinclair Wyoming Refinling Company Grude Oil Optimization Project Transmittal of Construction Permit Application October 10, 2011, rev. 0

Appendix F Fugitive Emissions Calculations

Re: Protocol for Equipment Leak Emission Estimates
(EPA-453/R-95-017, Table 2-10: Screening Value Correlations)
Valves / others = 500 ppm, Pumps = 2000 ppm

(EPA-453/R-95-017, Table 2-2: Refinery Average Emission Factors) - Connectors

AP-42, 4 ed, (Fugitive Emission Factors, Table 9.1-2) - Drains

Fuel Gas Service (Note 1)	Pump Seals	Valves	Flanges / Connectors	Drains	Olhers	VOC Emission Rate (TPY)
Quantity (Note 2)	6	525	1313	40	80	
Emissions Factor (lb/hr-						
source) Emissions (TPY)	0.0114	0.00052	0.00055	0.0175	0.0001	
Emissions (TPY)	0.3	1.2	3.2	3.1	0.0	7.8

Notes:

Fugitive emission component counts are estimated Orains are assumed to be included in "Others" category

Fugitive emissions - gasoline service

Composed	Liquid Mass	VOC Emission	HAP Emission
Component	Fraction	Rate (TPY)	Rate (TPY)
Benzene	0.0180	0.1399	0.1399
Hexane	0.0100	0.0777	0.0777
Xylene-o	0.0000	0.0000	0.0000
Xylene-m	0.0700	0.5442	0.5442
Xylene-p	0.0000	0.0000	0.0000
Totuene	0.0700	0.5442	0.5442
Ethylbenzene	0.0140	0.1088	0.1088
Trimethylpentane (2,2,4)	0.0400	0.3110	0.3110
Cumene	0.0050	0.0389	0.0389
TOTAL	0.2270	1.76	1.76

SBG/sbg

Sinclair Wyoming Refining Company Crude Oil Optimization Project Transmittal of Construction Permit Application October 10, 2011, rev. 0

Appendix G - HAP Emission Calculations

Appondix G Estimated MAP Emission Calculations - Now and Modified Sources

																														Total H-P	TPY		4.3E-31	225.30	3.18-64	1 25+00		3.5E.32	5.56-01	8.5F.51	4 08.04	S 08.71	525-36	4.75-8
Nidosi TPY		4.56-04	2.6.06	N.N.	N/N	ſ	27.5	3 1	200	3	4 2 2	4.E.o	i de la compania de l	5.35-03	Spochane		1	200	2 2 4	70.70	8.1E/US		a de la companya de l	Z.	X.	S S	K KIN	70 un	3.4E-41	Currene	, b.		N.A	KS	1.35-70	2 2		NA	N/A	N.W	N.A.	A/A	NGA A	4.0E-02
Mercury TPY		5.56.05	2.E36	XX.		R	I Pulse				83	4 8 8	9 10 10 10	2000	Phosphorus		1 95 55		100	2	N/A		27.42.72	95554	9.6E-C4	7	20000	1 2 2 2	0,95-03	Solecium	Ϋ́		1.9E-02	1.15.05	458	AUA AUA		2,26-03	2,86.02	3 BE-04	20°48 F	175.04	3.25-04	3.86-03
Manganese TPY		8.15-05	4.2E.06	W.	A)N		1 00 00 0	10.00	- C - C - C - C - C - C - C - C - C - C	4	CD-#C)	7.3E-05	20-23-6	9.35-04	8		9 55 573		00-03-0		N.S.			37.54	5,35-53	******	7	20.00	90.5500	Acroein	TPY		3.75-50	8.55.38	A.N	N/A		1.25-72	4.85.30	7.45-33	3.4=-53	3.3E-20	S=33	375-02
Lasc		1.16-04	6.3E-d5	žž	4.3		5.05.04	Ι	1000		П	ı	1	ZE-35	Bondo(e)cyrane Tov		1 36.26.	27 34	10 TO		NIA.	27.000	2000	9	5,55		1,15,0 0,010,0	7 48		Prans	Τ ² Υ		25-54	N/A	K/N	Α'n		5.8E-C5	1.15-03	1.85-03	8180	26-04	8.36-26	5.45-03
Cooper		1.86-04	4.2E-36	N/A	N/A		8.5€.74		1000	1,1100	1,176	20.00	1,20,00	2.10	Pha-amhieno B		3.7K-CR	2000	NG	2 2	200	1 25 00	3000	4,05-40	7.65-05	1	256.00	8 3E 0K	. CO-300	Xykhas	À		5.56-03	2,05,04	272-42	548-01		1,75-05	7.0E-03	1.1E-02	5.1E-02	2,96.03	2.56-08	6.0E-01
Cobs::		, BE-35	A/N	NA) XV=FX	7 P. C			2	1000	6-49-		Naphtralena	,	1 36.76	20,40,5	700		231	1 245 07	100000	1000	4.05.04	4 30 00	8 87 75	1 88-08		Haxane	TPY		3.96-0:	N/A	6.35.02	786-02		8.1E-04	5.15.01	7.96.7	3.7E-0-	3.5E-0'	8.BE-05	2.56+00
Спотічт(6) ТРУ		\$0.81.9	2.5.06	N/A	N/A		P. 000 C	2017	2000	22.00.0	940	200	3000	(444)	Fl,Oreno		5 gF.C7	POPERS	N/A	Alita	4	2 90.76	7.00.00		100000	5 35.07	3.95-07	978.05	,	Ethylpenzene	, by		3.5E-03	N'A	6.15-23	10 mg 1		2.9E-06	4.5E-08	7.0E-03	3.2E-03	\$.1E-03	8.9E-07	1.4E-01
Cadmium		2.4E-04	2.16-08	ΝΆ	A.N		7. E.33	- P. H.	A REST	77 100		7.555	5 10 10 10 10 10 10 10 10 10 10 10 10 10	403.48 T	Fluoranthens		BAE-C7	27.75	A)/2	FICE		80.00	8 3E C7	20.00	25000		4.2E-C7	1.36.05	***************************************	Toware	À		7.2E-04	2.95-04	7.95-32	546.31		3,0E-0\$	9,36-04	1.4E-03	8.7E.04	6.55.04	4.2E-07	6.3E-01
Beryllum		2.BE-05	2.15-08	NA	NA		100 SE	3.76.56	20.04.2	37.110	2007	2007	1.36.24	WW-WW	Chrysene		3.88.07	9.585.07	N/W	MA) FEAR	1 56.77	2000	10 HO C	20.00	238.27	4.3F-CB		Forms denyde:	-		1.6E-CZ	8.3E-04	N.A.	ž		1.65-05	2,16-02	3.2E-02	1.5E-02	1.3E-02	2.3E-07	1,0E-01
A'sanic		4,4E-05	2.8E-CB	N.A.	X.A		2.05-04	5.8E-05	9.9E-05	7.46.76	2000	0.95-00	2009		A-10-00000		1.06-08		NA	4/2		1 80 08 F	9, 44,	200	20,000	426.57	6.95.37	× 15		۳,	<u>, , , , , , , , , , , , , , , , , , , </u>		\$ W \$	8	8.9E-02	1.45.03		4.88-136	2,000	자양하	4 20 20 20 20 20 20 20 20 20 20 20 20 20	4.604	6.96-37	215-01
Finns Rate (MMB;u/m)		50.0	400,0 H ²	N/A	Z/N		233.00	84.2	0D2/GGL	48 ann	Ac dre	22.50			firing Rate (MMStuffir)		50.5	400.0 HP	NA	N/A		238.0	84.2	000.	45.3	24.5	23.4			Firing Rate	(MARSILLINE)		50.0	420.0 HP	ž	N/A		283.5	643	100.0	46.3	44.9	\$3.4	
Emissions Source		BSI Hoater	Now Emergency Air Compressor	100 N. obj tank	Fugitive Emissions	Potentie: to Emit	351 Crude Heater	SB3 Vacuum Hegge	Coker Unittana	Magazia Solder Hearer	However H	#: FDS design			Emissions Source		BSI Hasie:	_	Τ.		Poembal	581 Cruce Heater	L		Nachtra Solner Heater	Hasser 95	WINDS HOME			Emissions Squites		.n	SSI Meater	New Ethological Air Compressor	100 M b5/19-1K	Fubitive Emissions	Actenial to Emir	581 Crude Hegrer	532 Vacuum Heater	Coker Unit flats	Nachtha Splitter Meater	Heater H5	#1HOS'Heater	
Operating Urb.	New Sources - Potential to Emit	BSI	Boilemonte	Tank Farm	Equipment Lesist	Modified Sources, Potential to Emit	Set Crude Unit	Sto Vecurin Unit	Coker	781 Reference	Hadronarker	20H.J#	SUB-YOTAL		Operating Unit	New Sources - Potential to Smr.	:88:	es-ouusiing	Tark Fatt	Equement Leaks	Modified Sources - F	581 Crude Unit	SSS Vacuum Und	Coler	78; Reformer	Hydrograpker	#::HD3:	SUB-TOTAL		Operation 1 to 3	The State of	The Property of the Paris of th	BSI	8500M3005	TANK FARTII	Equipment Leaks	Madified Saurces - F	SB: Chide Und	588 Vsoutm Unit	<u> </u>	781 Reformer	Hydroracker	#; HDS	SUB-TOTAL

1) Fuel combustion emissions factors are lighted in Texas G.1. 2) Tank emissions deculated from speciation in YANKS 4.09 destinate 3) Fugline on selent based on speciation of gostline.

Table G1 HAP Emission Fedors for Mediers

		Emission
Category	HAB	- Fector
		2005 07
Metals	Arseric	(haph)*
	Ber/Cum	.30E-07
	Cacmium.	1.10E-06
	Charium(C)	2.805-07
	Cobelt	8,205.08
	Copper	8,305-07
	Lead	4.80E-07
	Manganese	\$.70E-C7
	Mercury	2.505-07
	Keksi	1 2.106-06
	Phosphorus	2,205-05
	Şelanum	8.805-07
PAR	A-11:13:8-9	4.706-09
	Coysette	1.805-08
	Fluoranthena	2,85€,59
	Fluorene	2,705-09
	Naphoralene	6.C0E-07
	Phenanthrans	1.70E-08
	Bergo alpudene	5.70E-08

HAP Emission Factors for Emergency Air Compressor

		Emission
Casacony	HA?	Factor
		Ibrania:::
Maceis	Arsenic	4.00€.0€
	Beryllium	3.00E-06
	Cadman	3.C0E-05
	Chronium	3,00E-0B
	Cobs	_
	Cooper	8.00E-06
	Land	8.00E
	Mandanese	: 6,00E-08
	Mercury	3,C0E-06
	Nickel	3,00E-05
	Phosphorus	ı
	Seignlun	1,506-06
PAH	Anthabane	1,875-36
	Chrisara	3.538-07
	Fl. oranitians	7.61E-05
	Fluorens	2 92E-C5
	Nachthalane	8.485-C5
	Phenattinana	2.945-76
	Benzo(2)ovreng	1.866-07

Factor	nigwwia.	7,675-04	9.33E-04	1.186-03	4,095-04	:	ř. – i	2.855-04	ŀ	S.25E-05
HAP		Abeltalothyde	Велеепе	Formacehyde	Teluena	Ethylbentaria	Нехале	Xvlanes	Prend	Accelein
Carecon		200								

1.38E-07. Benzo(e)pyrene 1000 When heesesny, an everage brake-specific tall consumption (BSEC) of 7.000 Bruho-hr was used to convert from lowovistu to lamp-m.

Sources
Fattor
mission

Air Towes Emissions Feature for Petroleum	Industry Combustion Devices, November 20, 1997,	Energy and Environmental Research Corp.
1 EER Resort		

MACT Floor Analysis Presentation" to 9WG by Jon Eddinger, January 13-14, 1996 (controlision of data from EPA database by ERG) 2 MACT Floor Presentation:

3 API Study

4 AP 42

"Alt Toxics Emissions Feators for Combustice Sources Using Perioleum-88aad Fuels" Vol. 1, Development of Emission Feators Using APINVSPA Approach, October 17, 1997, Table ES-1

http://www.eoa.gov/cis/shes/aps/2/ch38-final/c36s63.ne/ AP 42, Fifth Edition, Volume I Chapter 3: Stationary Insernal Combustion Sources Gasolina and Olesek Industrial Engines

Emission Estimation Protoco for Patrolism Refinatives
Version 2.1: Final ICR Version
Form Approved: 08/28/2011
OMB Control No.: 2020-0857
https://refinaly.org/sytate/Syta S Emission Estimation Protocol for Potroloum Refinences

Sinchir Wyoming Refining Company Orade Oil Optimization Project Transmittal of Construction Permit Application October 10, 2011, rev. 0

Appendix H - PSD Netting Emissions

Sinclair Wyoming Refining Company Crude Oil Optimization Project Transcritts, of Construction Permit Application October 10, 2011, rev. 0

Appendix H PSD Netting Emissions

EMISSIONS INCREASES

EMISSIONS INCREASES	EASES									
Operating	Emission	Current Firing Rate	Firing Rate for Allowable Estimated Extinated	SO2 Allovable Emissions	NOx Allowable Emissions	PM Altowable Emissions	PM 16 Estimated Emissions	PM 2.5 Estimated Emissions	CO Estimated Emissions	VGC Estimated Emissions
Vodified and New Courses	Source	(MMSculti)	(ANTHERNIA)	XAD	Xall	TEN	ZIFK.	TPY	TEN	M MANAGEMENT
581 Crude Unit	531 Crude Heater	133.2	233.0	8.9	30.6	1.9	0.1	9	40 X	3 3
583 Vacuum Unit	583 Vacuum Heater	64.2	64.2	2.5	8,4	0.5	0.5	0.5	11.2	1.5
Coker	Coker Unit flare	ΥN	0'001	3.8	29.8	0.8	9.0	8.0	162.1	27.6
781 Reformer	Naphtha Splitter Heater	34.5	46.3	8.1	7.1	4.0	4.0	4.0	\$.1	
Hydroctacker	Heater H5	35.7	6.44	1.7	6.9	4.0	4.0	0.4	7.9	=
HI HDS	#1HDS Heater	24.0	33.4	1.3	5.1	0.5	0.3	0.3	5.9	9.0
BSI	BSI Heater	N/A	50.0	1.9	9.9	4.0	0.4	0.4	8.8	1.2
Boilerhouse	New Emergency Air Compressor	ΑN	A/A	<0.1	0.7	<0.1	<0.1	<0.1	9.0	0.2
Tank Farm	100 M bbl tank	N.A	A/N	N/A	N/A	N/A	N/A	N/A	Y.Y.	7.8
Equipment Leaks	Fugidve Emissions	N/A	A/V	N/A	N/A	N/A	N/A	N/A	N/A	7.8
Subtotal Modified and New Sources:				21.9	98.2	4.7	4.7	4,7	245.3	54.5

October 10, 2011, rev. 0 Sindair Wyoming Refining Company Crude Oil Optimizzation Project Transmittal of Construction Permit Application

3 8

EMISSIONS INCREASES	ASES								HCC13C	
Operating	Émission	Current Firmg Rate	Firing Rate for Allowable Estimated Emissions	SO2 Allowable Emissions	NOx Allowable Emissions	P.M. Allowable Emissions	PM 10 Estimated Emissions	PM 2.5 Estimated Emissions	CO Estimated Emissions	VOC Estimate Emission
CHILL	Source	(MMBtu/hr)	(MMBtuhe)	Z. LIDA	Adl	XAL	XAI V	V-L	TPY	Kdi
Non-Modified Source	Non-Modified Sources:									
781 Reformer	LEF Heater	24.0	24.0	6.9	3.7	0.2	0.2	0.2	4.2	9.0
	≓t Reformer Heater	44.6	44.6	1.7	6.8	0.4		0.4		1.1
	#2 Reformer Heater	74.8	74.8	2.9	11.5	9.0		9.0	13,1	8.1
	#5 Reformer Heater	22.4	22.4	6.0	3.4	0.2		0.2	3.9	0.5
	Stabilizer Heater	1111	11.1	0.4	1.7	40.1	l	<0.1	1.9	0.3
Hydrocracker	Heater H1.H2	38.0	38.0	1.5	5.8	6.3	0.3	0.3	6.7	6.0
•	Heater H3	56.0	56.0	2.1	8.6	6.5		5,0	9.8	1.3
	Heater H4	57.0	57.0	2.2	8.7	6.5		0.5	10.0	
Coker	Coker Heater	145.0	145.0	5.5	21.0	1,2	1,2	1,2	25.4	3.4
	Coker (Material Handling)	N/A	N/A	N/A	N/A	Insignificant	Insignificant	Insignificant	N/A	V.V
780 FCCL	780 FCC Heater B3	10.0	10.0	4.0	10.1	<0,1	<0.1	<0.1	3.6	0.2
	780 FCC Heater H2	19.4	19.4	0.7	19.5	0.2	6.2	0.2	7.0	0.5
	780 FCCU Regenerator	A/A	N/A	57.8	9.99	70.5	70.5	48.7	504.0	23.3
#3 HDS	Charge Heater	28.0	28.0	1.1	4.3	0.2	0.7	0.2	4,9	0.7
F3 HDS	Спатес Неател	18.0	18.0	0.7	2.8	0.1	û .1	0.1	3.2	0.4
#4 HDS	H2 Heater (25-HT-101)	22.0	22.0	0.8	3,4	0.2	0.2	0,2	3.9	0.5
	H2 Heater (25-HT-102)	24.0	24.0	6.0	3.7	0.2	0.2	0.2	4.2	9.0
#1 H2 Plant	#1 H2 Plant Heater	288.0	288.0	0.5	82.0	2.3	2.3	2.3	(03.9	6.8
#2 H2 Plant	#2 H2 Plant Meater	N/A	288.0	5.6	12.6	2.3	2.3	2.3	25.2	6.8
#1.42.43.44 SRU	Ω1,¥3,44 TGTU	N/A	N/A	84.6	9.2	0.2	0.2	0.3	39.4	0.3
Asphalt Loading	Asphalt Heater #1	8.0	8.0	0.3	8.6	<0,1	<0.1	<0.1	2.9	0.2
Tank Fam	Working Losses	N/A	N/A	N/A	N/A	N/A	N/A	N/A	V/V	6.7
Light Oil Loading	Light Oil Loading Loading Rack Flare	N/A	N/A	N/A	8.0	N/A	Ϋ́Х	N/A	2.1	2.1
Subtotal Non-Modified Sources:	fied Sources:			171.4	294.3	80.3	\$0.3	58.6	787.1	54.7
TOTAL: MODIFI	TOTAL: MODIFIED + NEW + NON MODIFIED SOURCE	RCES		193.3	389.4	85.0	85.0	63.3	1,032.4	109.2

2.1 54.7 109.2

Sinclair Wyoming Refining Combany Crude Oil Optimization Project Transmittal of Constructon Permit Application October 10, 2011, rev. 0

PAST ACTUAL EMISSIONS

Operating	Emission Source Surve Sal Crote Heater 381 Vacuum Heater aphtha Splitter Heater LEF Heater #1 Reformer Heater #2 Reformer Heater #3 Reformer Heater Stabilizer Heater Stabilizer Heater Heater HI/H2 Heater HI/H2 Heater HI/H2	Actual Emissions TPY 1.7 0.4 0.5 0.5 0.2 0.2 0.2	Actual Emissions TPFY 3.5 9.9	Actual Emissions TPY	Estimated Emissions TPY	Eximated Emissions TPY	Actual Emissions	Actual Actual Emissions TPY
	Emission Source Crude Heater Vacuum Heater Is Splitter Heater Source Heater Homer Heater	Designation of the control of the co	Emissions 1777 9.9 3.5 0.7	Emissions TPY	Ertissions TPY	Emissions TPY	Emissions	Emissions TPY
	Crude Heater Vacuum Heater 12 Splitter Heater EF Heater eformer Heater eformer Heater eformer Heater eformer Heater eformer Heater former Heat	0.4 0.1 0.3 0.5 0.4 0.2 0.2	9.00	STATE OF STA				
# H	Crote Heater /acuum Heater /acuum Heater la Splitter Heater EF Heater eformer Heater eformer Heater eformer Heater eformer Heater floringer Heater bilizer Heater All H.2 Heater H.3 Heater H.4	0.4 0.1 0.3 0.5 0.4 0.2	3.5					
	vacuum Heater 12 Splitter Heater 15 F Huater eformer Heater eformer Heater eformer Heater bilizer Heater Eater H1/H2 Heater H3 Heater H3	0.4 0.1 0.3 0.5 0.4 0.2	3.5	7.0	0.7	0.7	0,4	2.1
	ua Splitter Heator LEF Hoater eformer Heator eformer Heator eformer Heator eformer Heator bilizer Heator eater HVHZ Heator H3 Heater H4	0.1 0.5 0.5 0.4 0.2	0.7	0.2	0.2	0.2	0.1	0.5
	eformer Heater eformer Heater eformer Heater eformer Heater blizzer Heater blizzer Heater Heater HIM2 Heater H3	0.5 0.4 0.2 0.2		9.0	1.0>	<0.1	5.1	0.2
	eformer Heater eformer Heater eformer Heater bilizer Heater eater HVH2 Heater H3 Heater H4	0.5 0.2 0.2	2.	0.1	0,1	0.1	2.5	0,3
	eformer Heater eformer Heater bilizer Heater eater HI/H2 Heater H3 Heater H4	0.4	1.9	0.2	0.2	0.2	9.5	9.0
	eformer Heater bilizer Heator eater HI/H2 Heater H3 Heater H4	0.2	2.3	0.2	0,2	0.3	7.2	0.5
	bilizer Heator eater H1/H2 Hostor H3 Heater H4	0.2	1.0	<0.1	1.0>	<0.1	2.9	0.2
	eater H1/H2 Heater H3 Heater H4		0.7	<0.1	<0.1	<0.1	1.5	0.2
	Heater H3 Heater H4	0.2	5.2	0.1	0.1	0.1	5.1	6.0
	Heater H4	0.3	5.2	0.2	0.2	0.2	7.8	5.0
H		0.5	8.8	0.3	0.3	0.3	13.6	6.0
T	Heater H5	0.2	3.4	0,1	0,1	0.1	2.5	Đ,4
Coker	Coker Heater	1.0	6.5	0.4	6.4	0.4	6.5	1,3
Coker (M	Coker (Material Hendling)	N/A	N/A	Trivial	Trivial	Trivial	N/A	Y.Z
780 FCCU 780 FG	780 PCC Heater B3	<0.1	2.2	<0.1	<0.1	<0.1	1.9	0.1
780 F	780 FCC Heater H.2	0.2	4.2	40.1	<0.1	<0.1	3.5	0.2
780 FC	780 FCCU Regenerator	57.8	9.99	70.5	70.5	48.7	504.0	23,3
#1 HDS #1#	HDS Heater	0.2	6.0	40.1	<0.1	<0.1	2.0	0.3
#2 HDS Cha	Charge Heater	<0.1	6.3	<0.1	<0.1	<0.1	0.8	1.0>
	Charge Heater	0.2	1.1	40.1	<0.1	<0,1	3,0	0.2
#4 HD\$ Heat	H2 Heater (25-HT-101)	<0.1	6.3	<0.1	<0.1	<0.1	<0.1	0.1
	H2 Heater (25-HT-102)	<0.1	0.5	<0.1	-05	<0.1	1.6	0.1
	#1 H2 Plant Heater	0.3	36.9	1.4	1,4	1.4	60.9	4.0
	#2 H2 Plant Heater	5.6	12.6	2.5	2.3	2.3	25.2	6.8
#1,#2,#3,#4 SRU #1,#	#1,#3,#4 TGTU	40.2	4.2	0.2	0.2	0.2	2.2	6.5
Asphalt Loading Asph	Asphalt Heater #1	<0.1	<0.1	<0.1	<0.1	9.0⊳	⊴0.1	<0.1
Tank Farm Wor	Working Losses	N/A	N/A	N/A	N/A	N/A	N/A	Ą.
Light Oil Loading Rack	Flare	N'A	N/A	N/A	N/A	N/A	N/A	0.5
TOTAL: PAST ACTUAL EMISS	SIONS	110.8	177.9	W.	77.5	55.8	667.2	7

October 10, 2011, rev. 0 Crude Oil Optimization Project Transmittal of Construction Permit Application Sinclair Wyoming Refining Company

CONTEMPORANGOUS CHANGES

		20S	čov V	00	200
	Emission	Actual Emissions	Actual Emissions	Actual Emissions	Actual Emissions
	Source	TPS	TIPY	Xdii	T.B.X
Increases	New CatOx (AP-11891)	<0.1	5.0	0,4	0,4
	Tank 406 (Change from EFR TO IRF)	N/A	N/A	N/A	₽.0
	Tank 498 (WV-11941)	N/A	N/A	N/A	11
	Evaporation Pand Water Transfer Pump (WV-11200)	₹.0	2.4	2.6	2.4
	Renewable Fuels Project (AP-11189)	Insignificant	2.8	7.1	8.7
	Pipeline Relief Storage Tanks (WV-10487)	N/A	N/A	A/N	8.1
	Boilerhouse Emergency Generator (MD-10656)	<0.1	0.2	7.2	0.2
	Steam Reliability and Fuel Gas Balance Project (MD-9659)	15.7	24.2	32.4	13.9
	Alky Turnaround Project (MD-10256)	N/A	N	N/A	22
	Delayed Coker Unit Project (MD-1381 A2)	926.6	362.8	540.9	105.3
	Boilerhouse Upgrade Project (MD-7911)	13.9	32.4	63.7	9.0
	Total	986.3	425.4	654.3	145.0
Deorbases	BHFO CD reductions (MD-9659)	16.4	NA	N/A	N/A
	Steam Reliability and Fuel Gas Balanoz Project (MD-9659)	N/A	N/A	25.2	6.8
	Delayed Colort Unit Project (MD-1381 A2)	916.7	353.5	479.8	48.6
	BHFO CD reductions (MD-9659)	31.0	N/A	N/A	N/A
	Shut down #10 HPB (MD-7911)	0.4	55.7	31.6	2.1
	Tank 509	N/A	N/A	N/A	6.0
	Controlled Drains (MD-9659)	N/A	N/A	N/A	8.0
	Old Firewater Pump	<0.1	0.5	<0.1	<0.1
		N/A	W/N	N/A	14.1
		964.6	409.7	536.7	80.5
NET Contemporaneous Cha	neous Changes	21.8	15.7	117.6	64.5

≻
2
4
-
~
▭
w
7
ĸ

Emissions	120 5	40.0
Emissions	187.8	100.0
NO: Emissions	227.2	40.0
SO2 Emissions	104.2	40.0
	NET EMISSIONS INCREASE with Contourness and Changes	PSD SIGNIFICANCE THRESHOLDS

፲

SBC/sbg

Sinclair Wyoming Refining Company Crude Oil Optimization Project Transmittel of Construction Permit Application October 10, 2011, rev. 0

Appendix I - New and Modified Heater - SCR Cost Analysis

Appendix la BACT Analysis for SCR on 581 Crude Unit Heater

SCR BACY analysis (ULNB baseline)

8asis:

EPA Air Pollution Control Cost Manual - Sixth Edition (EPA 452/B-02-001)

Direct Capital Cost (DCC)

oltat Cost (DCC) Equation Parameter Value Units Description				
Parameter	Value	Units	Description	
Qb	233	MM Blu/la	Heat Roloaso (HHV)	
N NOx	0.67	none (fraction)	NOx removal Efficiency	
ASR	1.05	поле	Actual stoichlometric ratio (default)	
q fuel gas	41559	scim (wet)	Gas flow rate (from method 19 "F factor")	
q tựci gas	115807	acfm (wet)	Gas Row rate	
Ammonia Slip	?	ppm	Anmonia slip adjustment factor	
N adj	0.992	none	NOx efficiency adjustment factor	
NOx adj	0.862	BOAB	Inlet NOx adjustment factor	
Slip adj	1.170	воле	Ammonia stip adjustment factor	
Sulfur adj.	0.964	PiQri B	Fuel sulfur adjustment factor	
Temp adj.	2.322	rone	Temperature adjustment factor	
Vol catalyst	1466.0	ft3	Catalyst votume	
Catalyst area	120.6	ft2	Cross sectional area of reactor	
Geometry adj.	138.7	ft2	Cross sectional area with adjustment	
Reactor I & w	11.8	ft	Reactor length and width	
n layer	3.4	ft	Number of catalyst layers	
rounding	3.0	ft	Rounded catelyst layers	
h layer	4.5	ft	Catalyst layer height	
rounding	5.0	fi	Rounded catelyst layer height	
n lotal	4.0	reozie	Total number of catalyst layers	
h SCR	57.0	fl	Reactor height	
m reagent	1.8	նե√եր	reagent consumption	
កា ទល់	6.2	Eb/Enc	aqueous reagent consumption	
q sol	0.8	gph	aqueous reagent consumption	
tank volume	280.3	gal	on-site storage volume	
f(h SCR)	160.94	\$/MM Blu	reactor height adjustment factor	
f(NH3 rate)	-44.11	\$/MM Blu	ammonia flowrate adjustment factor	
f(new)	0.00	\$/MM Btu	New Furnace, Zoro for Retrofit	
f(bypass)	0.55	\$/MM Blu	with SCR bypass	
f(Vol cetelyst)	\$498,444	\$	cost of initial catalyst @ \$340/ft3	
			NH3/NOx monitor (Note: added for this analysis,	
CEMS	\$120,000	\$	not included in EPA 452/B-02-001	
DCC	\$2,721,970	\$	direct capital cost - 1998 Manual	
			Annual Inflation rate 2008 to 2011 Nelson Ferrer	
annual inflation	7.9	%	Refinery Inflation Index	
		s		
	N NOx ASR q fuel gas q fuel gas q fuel gas q fuel gas Anmonia Slip N adj NOx adj Slip adj Sulfur adj Temp adj Vol catalyst Catalyst area Geometry adj Reactor I & w n layer rounding h layer rounding h layer rounding r total h SCR m reagent m sol q sol tank volume f(h SCR) f(new) f(bypass) f(Vol catalyst) CEMS DCC	Qb 233 N NOx 0.67 ASR 1.05 q fuel gas 41559 q fuel gas 115807 Anenonia Slip 2 N adj 0.992 NOx adj 0.862 Slip adj 1.170 Sulfur adj 0.964 Temp adj 2.322 Vol catalyst 1466.0 Catalyst area 120.8 Geometry adj 138.7 Reactor I & w 11.8 n layer 3.4 rounding 3.0 h layer 4.5 rounding 5.0 n total 4.0 h SCR 57.0 m reagent 1.8 m sol 6.2 q sol 0.8 tank volume 280.3 f(NSR) 160.94 f(NPAs rate) -44.11 f(new) 0.00 f(bypass) 0.55 f(Vol catalyst) \$498.444	Qb 233 MM Bloths N NOx 0.67 none (fraction) ASR 1.05 none q fuel gas 41559 scim (wet) q fuel gas 115807 acfm (wet) Antimonia Slip 2 ppm N adj 0.992 none NOx adj 0.862 none Slip adj 1.170 none Sulfur adj 0.964 none Temp adj 2.322 none Vol catalyst 1466.0 ft3 Catalyst area 120.6 ft2 Gometry adj 138.7 ft2 Reactor I & w 11.8 ft n layer 3.4 ft rounding 3.0 ft h layer 4.5 ft rounding 5.0 ft n lotal 4.0 none h SCR 57.0 ft m reagent 1.8 fb/fn q sol 0.8	

Indirect Capital Cost (ICC)

General Facilities	\$249,177	\$ 5% of DCC
Engineering and Home Office		\$ 10% of DCC
Process Contingency	\$249,177	\$ 5% of DCC
JCC	\$996,708	

Project Contingency

300 O <u>OI</u>	ingeroy		******		**************************************
Ī	Project Contingency	\$897,037	\$	15% of DCC + KCC	
	"MVIII."				1113444444

Total Plant Cost

0131 Ma <u>rt C091</u>		***************************************	***************************************
<u> </u>	Total Plant Cost	\$6,677,282	\$ DCC+lCC+Project Contingency

Alfowances

			· <u>''' - · · · · · · · · · · · · · · · · · </u>
Allowance for funds during construction	\$0	\$	Assume 0 for SCR
Royalty allowance	\$D	\$	Assume 0 for SCR
Preproduction cost	\$137,546	\$	2% of Total Plant Cost
Inventory capital	\$212	" \$	Ammonia solo. Inventory @ \$0.101/lb
Initial Catalyst and Chemicals	\$0	\$	Assume 0 for SCR
Subtotal allowances	\$137,768	\$	

Total Capital Investment (TCI)

apitot int gognom (10-)	***************************************	11177	
Total Capital Investment (TCI)	\$7,015,040	\$	

Direct Angual Costs

Equation	Parameter	Vetue	Units	Description
2.46	Meintenance	\$105,226	\$	Annual maintenance cost = 1.5% TCI
2.47	Reagent	\$5,525	\$	Ammonia soin. usage @ \$0.101/lb
2.48	Power	86	kVV	power consumption
2.49	Electricity	\$37,719	\$	\$0.05/kWN
	Performance Tosting	\$15,000	\$	per year (initial and annual RATA)
Catatyst Replaced	eent			
				Catalyst Replacement Cost @ \$340/ft3, replacing
2.50	CRC	\$166,148	\$	1 layer per year
	hcatalyst	24000	hours	catalyst life (assume 24,000 hrs)
	hyear	8760	hours	hours per year
2.53	Y	2.74	nçaé	Y factor for eq. 2.52
	rounding	3.0	поле	
	interest	0.1	ПСЛВ	annual interest rate (fraction)
2.52	FWF	0.302	none	Future Worth Factor
2.51	ARG	\$50,196	\$	Annual Replacement Cost
	1			Direct Annual Costs =
2.45	DAC	\$213,666	8	meint.+reagent+electricity+catelyst

Indirect Costs

ياتة	05IS	*******		** 402	
ſ		period	10	years	assume 10 year equipment life
		interest	0.1		annual interest rate (fraction)
	2.55	CRF	0.163	none	Capital Recovery Factor
	2.54	DAC	\$1,141,665	\$	Indirect Annual Cost

Total Annual Cost

	***************************************	"/V-A	*****	nricial Cost	Lotal Antic
2.66 1 TAC \$1,355,331 5 Total Annual Cost		\$ Total Annual Cost		266 1/4	i i

Cost Effectiveness

	HILL.				
Ī	2.57	NOx removed	20.4	tons	Tons NOx removed
	2.58	Cost Effectiveness	\$66,403	\$#on	Cost Effectiveness

Appendix Ib BACT Analysis for SCR on 583 Vacuum Unit Heater

SCR BACT analysis (ULNB baseline)

Basis:

EPA Air Pollution Control Cost Manual - Sixth Edition (EPA 452/8-02-061)

Direct Capital Cost (DCC)

Equation	Parameler	Value	Units	Description
2.3	Qb	64.2		Heat Release (HHV)
2.9	N NOx	0.67	none (fraction)	NOx removal Efficiency
2.11	ASR	1.05	воле	Actual stolchiometric ratio (default)
	q fuel gas	11451	scim (wet)	Gas flow rate (from method 19 °F factor")
2.12	g fuel gas	40881	ac(m (wet)	Gas flow rate
2.17	Ammonia Slip	2	ррm	Ammonia slip adjustment factor
2.20	N adj	0.992	none	NOx efficiency adjustment factor
2.21	NOx adj	0.862	none	Inlet NOx adjustment factor
2.22	Slip adj	1.170	поле	Ammonia slip adjustment factor
2.23	Sulfur adj.	0.964	none	Fuet sulfur adjustment factor
2.24	Temp adj.	1.091	กอกอ	Temperature adjustment factor
2.19	Vol catalyst	189.9	ft3	Calalyst votume
2.25	Catalyst area	42.6	ft2	Cross sectional area of reactor
2.26	Geometry adj.	49.0	ft2	Cross sectional area with adjustment
2,27	Reactor i & w	7.0	ſt	Reactor length and width
2,28	n layer	1.3	ft	Number of catalyst layers
	rounding	1.0	ft	Rounded catalyst layers
2,29	h layer	4.9	ft	Catalyst layer height
	rounding	5.0	ft	Rounded catalyst layer height
2.30	n total	2.0	none	Total number of catalyst layers
2.31	h SCR	33.0	ft	Reactor height
2,32	m reagent	0.5	lb/hr	reagent consumption
2,33	m sol	1.7	lb/hr	aqueous reagent consumption
2,34	q sol	0.2	goh	aqueous reagent consumption
2,35	tank volume	77.2	gal	on-site storage volume
2.37	f(h SCR)	14.06	\$/MM Btu	reactor height adjustment factor
2.38	f(NH3 rate)	-44.11	\$/MM Btu	ammonia flowrate adjustment factor
2.39 & 2.4	f(new)	0.00	S/MM Blu	New Furnace, Zero for Retrofit
2.42	f(bypass)	1.98	\$/MM Btu	with SCR bypass
2.43	f(Vol catalyst)	\$64,555	\$	cost of initial catalyst @ \$340/ft3
				NH3/NOx monitor (Note: added for this
	CEMS	\$120,000	\$	analysis, not included in EPA 452/B-02-001
2.36	DÇÇ	\$1,056,757	\$	direct capital cost - 1998 Manual
	·			Annual inflation rate 2008 to 2011 Netson
	annual inflation	7.9	%	Farrar Refinery Inflation Index
	DCC	\$1,934,770	3	direct capital cost - 2011

Indirect Capital Cost (ICC)

Capital Ocat (100)			
General Facilities	\$96,739	\$	5% of DCC
Engineering and Home Office	\$193,477	\$	10% of DCC
Process Contingency	\$96,739	\$	5% of DCC
ICC	\$386,954	i	

Project Contingency

Condigono					
	Decidal Configuration	\$348,259	¢	15% of DCC + ICC	
31	Project Conningency	9040,200	٠	101001 200 14-	
				11-1	

Total Plant Cost

iant Cost			 	
	Total Plant Cost	\$2,669,983	\$ DCC+ICC+Project Contingency	

Allowances

492) <u>.</u>			
ſ	Allowance for funds during construction		\$	Assume 0 for SCR
	Royalty allowance	\$0	\$	Assume 6 for SCR
╟	Preproduction cost	\$53,400	\$	2% of Total Plant Cost
╟	Inventory capital	\$58	\$	Ammonia soln, inventory @ \$0.101/lb
╟	Initial Catalyst and Chemicals	\$O	··· \$	Assume 0 for SCR
ľ	Şubtolal allowances	\$53,458	\$	

Total Capital Investment (TCI)

apital invostricit (101)			
Total Capital Investment (TCI)	\$2,723,441	*** \$ <u>.</u>	

Direct Annual Costs

Equation	Parameter	Value	Units	Description
2,46	Maintenance	\$40,852	\$	Annual maintenance cost = 1.5% TCl
2.47	Reagent	\$1,522	\$	Ammonia soln. usage @ \$0.101/lb
2.48	Power	17	kW	power consumption
2.49	Electricity	\$7,440		\$0.05/kWh
	Performance Testing	\$15,000		per year (initial and annual RATA)
atalyst Replacer				
		Ī		Catalyst Replacement Cost @ \$340/ft3,
2.50	CRC	\$64,555	\$	replacing 1 layer per year
	hcalalysi	24000	hours	catalyst life (assume 24,000 hrs)
	hyear	8760	hours	hours per year
2.53	Y	2.74	none	Y factor for eq. 2.52
	rounding	3.0	none	
	interest	0.1	поле	annual interest rate (fraction)
2.52	FWF	0.302	nona	Future Worth Factor
2.51	ARC	\$19,503	\$	Annual Reptacement Cost
	1			Direct Annual Costs =
2.45	DAC	\$84,318	\$	maint.+reagent+electricity+catelyst

indirect Costs

UV818				
	period	10		assume 10 year equipment life
"	interest	0.1	none	annual Interest rate (fraction)
2.55	CRF	0.163	none	Capital Recovery Factor
2.54	IDAC .	\$443,227	\$	Indirect Annual Cost

Total Annual Cost

• ••••	EGI 0001			 	
ı	2.56	TAC	\$527,545	\$ Total Annual Cost	
		,			

Cost Effectiveness

 T. T. T		_		······································
2.57	NOx removed	5.6	tons	Tons NOx removed
2.58	Cost Effectiveness	\$93,804	\$/ton	Cost Effectiveness

Appendix Ic BACT Analysis for SCR on #1 HDS Heater

SCR BACT analysis (UENB baseline)

Basis:

EPA Air Pollution Control Cost Manual - Sixfn Edition (EPA 452/8-02-001)

Direct Capital Cost (DCC)

ital Cost (DCC)		1	14.50	Donatalian
Equation	Parameter	Value	Units	Description
2.3	Gt)	33.4	MM Blu/hr	Heat Release (HHV)
2.9	N NOx	0.71		NOx removal Efficiency
2.11	ASR	1.05	enone	Actual stoichiometric ratio (default)
	q fuel gas	5957	sc(m (wet)	Gas flow rate (from method 19 "F factor")
2.12	q fuel gas	31641	acfm (wet)	Gas flow rate
2.17	Ammonia Slip	2	ppm	Ammonia stip adjustment factor
2.20	N ad	1.043	none	NOx efficiency adjustment factor
2.21	NOx adj	0.864	none	Intel NOx adjustment factor
2.22	Stip adj	1.170	noné	Ammonia stip adjustment factor
2.23	Sulfur ad.	0.964	nonė	Fuel sulfur adjustment factor
2.24	Temp ad.	12,659	noné	Temperature adjustment factor
2.19	Vol catalyst	1206.3	fi3	Catalyst volume
2.25	Catalyst area	33.0	fi2	Cross sectional area of reactor
2.26	Geometry ad.	37.9	fi2	Cross sectional area with adjustment
2,27	Reactor I & w	6.2	fl	Reactor length and width
2,28	n layer	10.3	fl	Number of catalyst layers
	rounding	10.0	fl	Rounded catelyst layers
2.29	h layer	4.2	fl	Catalyst layer height
	rounding	4.0	fi	Rounded catalyst layer height
2.30	n total	11.0	nono	Total number of catalyst layers
2.31	h SCR	130.0	ft	Reactor height
2.32	m reagent	0.3	lb/hr	reagent consumption
2.33	m soi	1.1	lb/hr	aqueous reagent consumption
2.34	g sol	0.1	gph	aqueous reagent consumption
2.35	tank volume	50.2	gal	on-site storage volume
2.37	f(h SCR)	607.7	\$/MM Btu	reactor height adjustment factor
2.38	f(NH3 rate)	-43.31	\$/MM Btu	ammonia flowrate adjustment factor
2.39 & 2.4	f(new)	0.00	S/MM Btu	New Furnace, Zero for Retrofit
2.42	f(bypass)	3.80	\$/MM Btu	with SCR bypass
2.43	((Vol catalyst)	\$410,129	\$	cost of initial catalyst @ \$340/ft3
	1,		,	NH3/NOx monitor (Note: added for this
	CEMS	\$120,000	i s	analysis, not included in EPA 452/B-02-001
2.36	DCC	\$1,201,950	\$ \$	direct capital cost - 1998 Manual
2.00	T	V	<u> </u>	Annual inflation rate 2008 to 2011 Nelson
	annual inflation	7.9	%	Farrer Refinery Inflation Index
	DCC	\$2,200,609	\$	direct capital cost - 2011

Indirect Capital Cost (ICC)

Capital Cost (ICC)		
General Facilities	\$110,030	\$ 5% of DCC
Engineering and Home Office	\$220,061	\$ 10% of DCC
Process Contingency	\$110,030	\$ 5% of DCC
ICC	\$440,122	

Project Contingency

_	Project Contingency	\$396,110	\$ 15% of DCC + ICC	
	 		 	

Total Plant Cost

ant Cost		
Total Plant Cost	\$3,036,841	\$ DCC+ICC+Project Contingency

Allowances

-53			
F	Allowance for funds during construction		\$ Assume 0 for SCR
╢	Royalty allowance	\$0	\$ Assume 0 for SCR
$\ \cdot \ $	Preproduction cost	\$60,737	\$ 2% of Total Plant Cost
r	Inventory capital	\$38	\$ Ammonia soln. inventory @ \$0,101/lb
ı	Initial Catalyst and Chemicals	\$0	\$ Assume 0 for SCR
ľ	Sublotal allowances	\$60,775	\$

Total Capital Investment (TCI)

atmentionagine (101)		****	
Total Capital Investment (T	00	\$ 	

Direct An<u>nual</u> Costs

Equation	Parameter	Value	Units	Description
2.46	Maintenance	\$46,464	- \$	Annual maintenance cost = 1.5% TCI
2.47	Reagent	\$990	***	Ammonia soln. usage @ \$0.101/fb
2.48	Power	25	kW	power consumption
2.49	Electricity	\$10,791	\$	\$0.05/kWh
	Performance Testing	\$15,000	- \$	per year (initial and annual RATA)
atalyst Replaces	nent			
				Catalyst Replacement Cost @ \$340/fl3,
2.50	CRC	\$41,013	\$	replacing 1 layer per year
	hcatelyst	24000	hours	catalyst life (assume 24,000 hrs)
	hyear	8760	hours	hours per year
2.53	Y	2.74	none	Y factor for eq. 2.52
	rounding	3.0	none	
	interest	0.1	none	annual interest rate (fraction)
2.52	FWF	6.302	none	Future Worth Factor
2,51	ARC	\$12,391	\$	Annual Replacement Cost
		İ		Direct Annual Costs =
2.45	DAC	\$85,636	\$	maint.+reagent+electricity+catalyst

Indirect Costs

~	0.543				
Ę		period	10	years	assume 10 year equipment life
į		interest	0.1	none	annual interest rate (fraction)
ł	2.55	CRF	0.163	none	Capital Recovery Factor
I	2.54	IDAC	\$504,123	\$	Indirect Annual Cost

Total Annual Cost

-	2.56	TAC	\$589,758	\$ Total Annual Cost	

Cost Effectiveness

11111						
	2.57	NOx removed	3.7	tons	Tons NOx removed	
	2.58	Cost Effectiveness	\$161,255	\$/ton	Cost Effectiveness	

Appendix Id BACT Analysis for SCR on Naphtha Splitter Heater

SCR BACT analysis (ULNB baseline)

Basis:

EPA Air Pollution Control Cost Manual - Sixth Edition (EPA 452/8-02-001)

Direct Capital Cost (DCC)

Equation	Parameter	Value	Units	Description
2.3	Qb	46.3	MM Blu/hr	Heat Release (HHV)
2.9	N NOx	0.71	none (fraction)	NOx removal Efficiency
2,11	" ASR	1.05	ропа	Actual stotchiometric ratio (default)
• • • • • • • • • • • • • • • • • • • •	q fuel gas	8258	scim (wat)	Gas flow rate (from method 19 "F factor")
2.12	q fuel gas	20616	ac/m (wet)	Gas flow rate
2.17	Ammonia Slip	2	ррт	Ammonia slip adjustment factor
2.20	N ad	1.043	none	NOx efficiency adjustment factor
2.21	NOx adj	0.864	none	inlet NOx adjustment factor
2.22	Stip adj	1.170	none	Ammonia slip adjustment factor
2.23	Sulfur adj.	0.964	none	Fuel sulfur adjustment factor
2.24	Temp adj.	3.791	none	Temperature adjustment factor
2.19	Voi catalyst	500.8	ft3	Catalyst volume
2.25	Catalyst area	21.5	m ft2	Cross sectional area of reactor
2.26	Geometry adj.	24.7	ft2	Cross sectional area with adjustment
2.27	Reactor I & W	5.0	A	Reactor length and width
2.28	n tayer	6.5	ft	Number of catalyst layers
	rounding	7.0	ft	Rounded catalyst layers
2.29	h layer	3.9	î ft	Catalyst layer helgfit
	rounding	4.0	î fi	Rounded catalyst layer height
2.30	n folal	8.0	none	Total number of catalyst layers
2.31	h SCR	97.0	- Et	Reactor height
2.32	m reagent	0.4	lb/hr	reagent consumption
2.33	m sol	1.6	lb/hr	aquaous reagent consumption
2.34	q sal	0.2	gph	aqueous reagent consumption
2.35	tank volume	69.6	gal	on-site storage volume
2.37	f(h SCR)	405.74	\$/MM Btu	reactor height adjustment factor
2.38	f(NH3 rate)	-43.31	\$/MM Btu	ammonia flowrate adjustment factor
2.39 & 2.4	(new)	0.00	\$/MM Btu	New Furnace, Zero for Retrofit
2.42	f(bypass)	2.74	\$/MM Blu	with SCR bypass
2.43	f(Vol catalyst)	\$170,273	\$	cost of initial catalyst @ \$340/ft3
				NH3/NOx monitor (Note: added for this
	CEMS	\$120,000	\$	analysis, not included in EPA 452/8-02-00
2.36	DCC	\$1,078,269	\$	direct capital cost - 1998 Manual
				Annual inflation rate 2008 to 2011 Nelson
	annual inflation	7.9	%	Farrar Refinery Inflation Index
	DCC	\$1,974,156	\$	direct capital cost - 2011

Indirect Capital Cost (ICC)

-3	JRBI COST (ICC)		
	General Facilities	\$98,708	\$ 5% of DCC
	Engineering and Home Office	\$197,416	\$ 10% of DCC
1	Process Contingency	\$98,708	\$ 5% of DCC
	ICC	\$394,831	

Project Contingency

C Contingency		 		······································
	Project Contingency	\$	15% of DCC + ICC	

Total Plant Cost

lant Cost			 	
	Total Plant Cost	\$2,724,335	\$ DCC+ICC+Project Contingency	

Allowances

4			
[Allowance for funds during construction	\$0	\$ Assume 6 for SCR
I	Royalty allowance	\$0	\$ Assume 0 for SCR
Ī	Preproduction cost		2% of Total Plant Cost
į	. Inventory capital	\$53	\$ Ammonia soln. inventory @ \$0.101/lb
	Initial Catalyst and Chemicals		\$ Assume 0 for SCR
	Subtotal allowances	\$54,539	\$

Total Capital Investment (TCI)

apital nivestificiti (FOI)	
Total Capital Investment (TCI)	

Direct An<u>nual Cost</u>s

Equation	Parameter	Value	Unils	Description
2.46	Maintenance	\$41,683	\$	Annual maintenance cost = 1.5% TCI
2.47	Reagent	\$1,372	\$	Ammonia soin, usage @ \$0.101/lb
2.48	Power	27	k₩	power consumption
2.49	Electricity	\$11,765	\$	\$0.05/kWh
	Performance Testing	\$15,000	\$	per year (Initial and annual RATA)
atelyst Replacer	nent			
			· · · ·	Catalyst Replacement Cost @ \$340/ft3.
2.50	CRC	\$24,325	\$	replacing 1 layer per year
	heatalyst	24000	hours	catalyst life (assume 24,000 hrs)
	hyear	8760	hours	hours per year
2.53	Y	2.74	none	Y factor for eq. 2.52
	rounding	3.0	none	
	interest	0.1	none	annual interest rate (fraction)
2.52	FWF	0.302	none	Future Worth Factor
2,51	ARC	\$7,349	\$	Annual Replacement Cost
			<u> </u>	Direct Annual Costs =
2.45	DAC	\$77,169	\$	maint.+reagent+electricity+catalyst

Indirect Costs

CD313					
	~"	period	10		assume 10 year equipment life
		Interest	0.1	nonė	annual interest rate (fraction)
i	2.55	CRF	0.163		Capital Recovery Factor
	2.54	IDAÇ.	\$452,249		Indirect Annual Cost

Total Annual Cost

:				 	
	2.58	TAC	\$529,418	\$ Total Annual Cost	

Cost Effectiveness

2.57	NOx removed	5.1	tons	Tons NOx removed
2.58	Cost Effectiveness	\$104,425	\$/ton	Cost Effectiveness

Appendix le BACT Analysis for SCR on Hydrocracker H5 Heater

SCR BACT analysis (ULNB baseline)

Basis:

EPA Air Poliution Control Cost Manual - Sixth Edition (EPA 452/8-02-001)

ital Cost (DCC) Equation	Parameter	Value	Units	Description
2.3	Qb	44.9	MM Stwhr	Heat Release (HHV)
2.9	N NOx	0.71	none (fraction)	NOx removal Efficiency
2.11	ASR	1.05	поле	Actual stelchiometric ratio (default)
	g fuel gas	8009	scfm (wet)	Gas flow rate (from method 19 °F factor")
2.12	q fuel gas	24873	ac(m (wet)	Gas flow rate
2.17	Ammonia Slip	2	ppm	Ammonia slip adjustment factor
2.20	N adi	1.043	none	NOx efficiency adjustment factor
2.21	NOx adj	0.884	none	Inlet NOx adjustment factor
2.22	Slip adj	1.170	none	Ammonia slip adjustment factor
2.23	Sulfur adj.	0.964	none	Fuel sulfur adjustment factor
2.24	Temp adj.	1.338	none	Temperature adjustment factor
2.19	Voi catalyst	171.4	ft3	Catalyst volume
2.25	Catalyst area	25.9	ft2	Cross sectional area of reactor
2.26	Geometry adj.	29.8	ft2	Cross sectional area with adjustment
2.27	Reactor & w	5.5	ft	Reactor length and width
2.28	n layer	1.9	ft	Number of catalyst layers
	rounding	2.0	ft	Rounded catalyst layers
2.29	in layer	3.9	ft	Catalyst tayer height
	rounding	4.0	ft	Rounded catalyst layer height
2,30	n total	3.0	none	Total number of calalyst layers
2,31	h SCR	42.0	ft	Reactor height
2,32	m reagent	0.4	lb/hr	reagent consumption
2.33	m soi	1.5	lb/hr	aqueous reagent consumption
2.34	0.50	0.2	gph	aqueous reagent consumption
2.35	tank volume	67.5	gal	on-site storage volume
2.37	f(h SCR)	69.14	\$/MM Btu	reactor height adjustment factor
2.38	f(NH3 rate)	-43.31	\$/MM Stu	ammonia flowrate adjustment factor
2.39 8 2.4	f(new)	0.00	\$/MM Stu	New Furnace, Zero for Retrofit
2,42	f(bypass)	2,83	\$/MM Stu	with SCR bypass
2.43	f(Voi catalyst)	\$58,282	\$	cost of initial catalyst @ \$340/ft3
				NH3/NOx monitor (Note: added for this
	CEMS	\$120,000	\$	analysis, not included in EPA 452/B-02-001
2.36	DCC	\$881,303	\$	direct capital cost - 1998 Manual
			1	Annual inflation rate 2008 to 2011 Nelson
	annual inflation	7.9	%	Farrar Refinery Inflation Index
_ ,	DCC	\$1,613,539	\$	direct capital cost - 2011

Indirect Capital Cost (ICC)

General Facilities	\$80,677	\$	5% of DCC
Engineering and Home Office	\$161,354	\$	10% of DCC
Process Contingency	\$80,677	.	
ICC	\$322,708		

Project Contingency

 	_/ -				
	D:	ልላስላ 4ላማ		145% ALDCC + ICC	
1	Project Contingency!	\$290.437	₽	11370 01 0000 1 1000	
 1	1 7 7 7 7 7 1 1 1 1 1 1 1 1 1 1 1 1 1 1			····-	
				···	

Total Plant Cost

Q IS	i Vosi			 	
Γ		Total Plant Cost	\$2,226,684	\$ DCC+ICC+Project Contingency	
-		·		 	

Allowances

Allowance for funds during construction	\$0	\$ Assume 0 for SCR
Royalty allowance	30	\$ Assume 0 for SCR
Preproduction cost	\$44,534	\$ 2% of Total Plant Cost
Inventory capital	\$51	\$ Ammonia soln. Inventory @ \$0.101/ib
Initial Catalyst and Chemicals	\$0	\$ Assume 0 for SCR
Subtotal allowances	\$44,585	\$

Total Capital Investment (TCI)

Salar myosiment (1 or)		 	
Total Capital Investment (TCI)	\$2,271,269	\$ 	

Direct Annual Costs

Equation	Parameter	Value	Units	Description
2.46	Maintenance	\$34,069	\$	Annual maintenance cost = 1.5% TCI
2.47	Reagent	\$1,331	\$	Ammonia soln. usage @ \$0.101/lb
2.48	Power	14	k₩	power consumption
2.49	Electricity	\$6,246	. \$	\$0.05/kWh
	Performance Testing	\$15,000	\$	per year (initial and annual RATA)
atalyst Reptacen	nent			
				Catalyst Replacement Cost @ \$340/ft3,
2.50	CRC	\$29,141	\$	replacing 1 layer per year
	hcalelyst	24000	hours	catalyst life (assume 24,000 hrs)
	hyear	8760	hours	hours per year
2.53	Y	2.74	none	Y factor for eq. 2,52
	rounding	3.0	none	
	interest	0.1	поле	annual interest rate (fraction)
2.52	FWF	0.302	none	Future Worth Factor
2.51	ARC	\$8,804	\$	Annual Replacement Cost
	<u> </u>			Direct Annual Costs =
2.45	DAC	\$65,450	s	maint.+reagent+electricity+catalyst

Indirect Costs

	period	10	years	assume 10 year equipment life
	interest	0.1	none	annual interest rate (fraction)
2.55	CRF	0.163	none	Capital Recovery Factor
2.54	IDAC	\$389,639	\$	Indirect Annual Cost

Total Annual Cost

THE COOL			 	
2.56	TAC	\$435,089	\$ Total Annual Cost	

Cost Effectiveness

2.57	NOx removed	4.9	lons	Tons NOx removed
2.58	Cost Effectiveness	\$88,495	\$/ton	Cost Effectiveness

Appendix If BACT Analysis for SCR on BSI Heater

SCR BACT analysis (ULNB baseline)

Basis:

EPA Air Pollution Control Cost Manual - Sixth Edition (EPA 452/B-02-001)

Direct Capital Cost (DCC)

Equation	Parameter	Value	Units	Description
	Qb	50	MM Stu/hr	Heat Release (HHV)
2.3		0.67		NOx removal Efficiency
2.9	N NOx			Actual stoichiometric ratio (default)
2.11	ASR	1.05	none	
	q fuel gas	8918	scfm (wet)	Gas flow rate (from method 19 "F factor")
2.12	q fuel gas	27698	acfm (wet)	Gas flow rate
2.17	Ammonia Slip	2	opm	Ammonia silp adjustment factor
2.20	N ad	0.992	none	NOx efficiency adjustment factor
2.21	NOx adj	0.862	none	Inlet NOx adjustment factor
2.22	Stlp adj	1.170	none	Ammonia slip adjustment factor
2.23	Sulfur adj.	0.964	none	Fuel sulfur adjustment factor
2,24	Temp adj.	1.338	none	Temperature adjustment factor
2.19	Vol catalyst	181.3	ft3	Catalyst volume
2.25	Catalyst area	28.9	ft2	Cross sectional area of reactor
2.26	Geometry adj.	33.2	112	Cross sectional area with adjustment
2.27	Reactor & w	5.8	E E	Reactor length and width
2.28	n layer	1.8	i R	Number of catalyst layers
	rounding	2.0	R	Rounded catalyst layers
2.29	h layer	3.7	R	Catalyst layer height
	rounding	4.0	R	Rounded catalyst layer height
2.30	n tolal	3.0	none	Total number of catalyst layers
2.31	h SCR	42.0	ft	Seactor height
2.32	m reagent	0.4	Fo/hr	reagent consumption
2.33	m sol	1.3	Ro/hr	aqueous reagent consumption
2.34	g sol	0.2	gph	aqueous reagent consumption
2.35	lank volume	60.2	gal	on-site storage volume
2.37	f(h SCR)	69.14	\$/MM Blu	reactor height adjustment factor
2.38	f(NH3 rate)	-44.11	\$/MM Blu	ammonia flowrate adjustment factor
2.39 & 2.4	f(new)	-14.58	\$/MM Blu	New Furnaça, Zero for Retrofit
2.42	f(bypass)	2.54	S/MM Blu	with SCR bypass
2.43	f(Vol calalyst)	\$61,652	\$	cost of initial catalyst @ \$340/ft3
2.70	it and adianate	401,000		NH3/NOx monitor (Note: added for this
	CEMS	\$120,000	8	analysis, not included in EPA 452/B-02-001
2.36	DCC	\$932,133	\$ \$	direct capital cost - 1998 Manual
2.30		400E/100	 	Annual inflation rate 2008 to 2011 Nelson
	annual inflation	7.9	%	Farrar Refinery Inflation Index
	DCC	\$1,706,602	3	direct capital cost - 2011

Indirect Capital Cost (ICC)

~	shree coar (i.c.c)		
į	General Facilities	\$85,330	\$ 5% of DCC
į	Engineering and Home Office		\$ 10% of DCC
Š	Process Contingency:	\$85,330	\$ 5% of DCC
	ICG	\$341,320	

Project Contingency

Project Contingency	\$307,188	\$	15% of DCC + ICC	
 	<u> </u>	•		

Total Plant Cost

fant Cost			
· · · · · · · · · · · · · · · · · · ·	Tolal Plant Cost	\$2,355,111	\$ DCC+ICC+Project Contingency

Allowances

263			
Allowar	ice for funds during construction	\$0	\$ Assume 0 for SCR
_	Royalty allowance	\$0	\$ Assume 0 for SCR
 	Preproduction cost	\$47,102	\$ 2% of Total Plant Cost
	Inventory capital	\$45	\$ Ammonia soln. Inventory @ \$0.101/lb
	Initial Catalyst and Chemicals	\$0	\$ Assume 0 for SCR
	Subtotal allowances	\$47,148	\$

Total Capital Investment (TCI)

apital livesiment (for)		 ···	·········
Total Capital Investment (TCI)	\$2,402,259	\$ 	

Direct Annual Costs

Equation	Parameter	Value	Units	Description
2.46	Maintenance	\$36,034	\$	Annual maintenance cost ≃ 1.5% TCI
2.47	Reagent	\$1,186	\$	Ammonia sols, usage @ \$0.181/fb
2.48	Power	16	kW	power consumption
2.49	Electricity	\$6,944	\$	\$0.05/kVVh
	Performance Testing	\$15,000	\$	per year (initial and annual RATA)
alatyst Replacen	nent			
	1			Catalyst Replacement Cost @ \$340/ft3,
2.50	CRC	\$30,826	\$	replacing 1 layer per year
	hcatalyst	24000	hours	catalyst life (assume 24,000 hrs)
	hyear	8760	hours	hours per year
2,53	- Y	2.74	none	Y factor for eq. 2.52
	rounding	3.0	កល្វាច	
	Interest	0.1	none	annual Interest rate (fraction)
2.52	FWF	0.302	поле	Future Worth Factor
2.51	ARC	\$9,313	\$	Annual Replacement Cost
	· · · · · · · · · · · · · · · · · · ·			Direct Annual Costs =
2.45	DAC	\$68,477	\$	maint.+reagent+electricity+catalyst

Indirect Costs

Gasis				
	períod	10	years	assume 10 year equipment life
	interest	Q.1	none	annual interest rate (fraction)
2.55	CRF	0.163	none	Capital Recovery Factor
2.54	IDAC	\$390,957	\$	Indirect Annual Cost

Total Annual Cost

-Auti	uai Ousi			 	
	2.56	TAC	\$459,434	\$ Total Annual Cost	

Cost Effectiveness

2.57	NOx removed	4.4	tons	Tons NOx removed
2.58	Cost Effectiveness	\$104,894	\$/ton	Cost Effectiveness

Refining Company
Crade Oil Optimization Project
Transmittal of Construction Permit Application
October 10, 2011, rev. 0

Appendix J - Detailed Ambient Air Quality Modeling Analysis

Sinclair Wyoming Refining Company

Crude Optimization Project Air Dispersion Modeling Report



October 10, 2011

TABLE OF CONTENTS

SECTIO	N 1 Gen	eral Modeling Diseassion	1-1
1.1	Projec	ct Overview	1-1
1.2		ling Applicability and Pollutants to be Evaluated	
	1,2,1	General PSD Modeling Approach	
	1.2.2	Class 1 and II Area Significant Impact Analyses	
	1.2.3	Class I and II Area Cumulative Impact Analyses	
	1,2,4	WDEQ-AQD Inhalation Risk Assessment	
1.3	Mode	l Design Concentrations	1-5
	1.3.1	Significant Impact Analyses	1-5
	1.3.2	Cumulative NAAQS Analyses	1-5
	1.3.3	PSD Increment Analyses	
1.4	Propo	sed Modeling Procedures for Individual Pollutants	1-6
	1.4.1	NO ₂ 1-hour and Annual Modeling	
	1.4.2	SO ₂ Modeling	1-7
	1.4.3	CO 1-hour and 8-hour Average Modeling	1-8
	1.4.4	PM ₁₀ 24-hour and Annual Average Modeling	1-8
	1.4.5	PM _{2.5} 24-hour and Annual Average Modeling	1-8
SECTIO	N 2 Moo	lei Selection ,	2-1
SECTIO	N 3 Site	Location	3-1
SECTIO	N 4 Plot	Plan	4-1
SECTIO	N 5 Mod	leling Emissions Inventory	5-1
5,1		Teant Impact Modeling Sources	
5.2		lative Impact Modeling - On-site Sources	
5.3		lative Impact Modeling - Off-property Sources and Parameters	
5.4		ground Concentrations	
SECTIO	N 6 Lan	d Use and Terrain	6-1
SECTIO	N 7 Buil	ding Wake Effects (Downwash)	7-1
SECTIO	N 8 Rec	eptor Grids	8-1
8.1		otors for Class I Impact Modeling Analyses	
8.2		ntors for Class II Preliminary Modeling Analyses	

8.3	Receptors for Class II Cumulative Impact and Increment Modeling Analyses 8-1
SECTION	9 Meteorological Data9-1
SECTION	10 Model Refinements and Post-processing
10.1	NO ₂ Modeling Options
SECTION	11 Modeling Results and Submittals11-1
11,1	Modeling Results for NO ₂
11.2	Modeling Results for SO ₂
	Modeling Results for CO11-2
11.4	Modeling Results for PM ₁₀
11.5	Modeling Results for PM _{2.5}
11,6	Modeling Results for Class I Area SID
11.7	WDEQ-AQD Inhalation Risk Assessment
SECTION	12 Additional IMPACTS Analyses
12,1	Visibility, Soils, and Vegetation12-1
	12.1.1 Growth Analysis
	12.1.2 Soils and Vegetation Analysis
12.2	Chang I Arms AORVo

TABLE OF CONTENTS (CONTINUED)

iii

SECTION 1 GENERAL MODELING DISCUSSION

Sinclair Wyoming Refining Company (SWRC) owns and operates a refinery located in Sinclair, Carbon County, Wyoming. The site is currently a major source for Prevention of Significant Deterioration (PSD) since the site wide Potential to Emit (PTE) for all criteria pollutants is greater than 250 (py. The proposed facility modifications trigger PSD review for numerous criteria pollutants as described in Section 1.2 and in the permit application document submitted to WDEO-AOD.

1.1 Project Overview

SWRC is planning to increase the crude oil refining capacity and implement other miscellaneous projects at its petroleum refinery located in Sinclair, Wyoming. The crude optimization project consists of:

- Removal of the 581 Crude Unit heater firing rate limit and replacement of the 581 Crude Unit atmospheric distillation tower;
- Modification of the 583 Vacuum tower to accommodate the resulting increase in reduced crude feedstock from the debottlenecked 581 Crude Unit; and
- Allowing the combustion of sweetened refinery fuel gas in the Coker Flare to accommodate potential periods when the refinery may have to operate in a fuel gas imbalance condition.

In addition, the application includes the following projects that are unrelated to the increase of crude oil refining capacity:

- Removal of the firing rate limits for the #I HDS heater, Naphtha Splitter heater and Hydrocracker H5 heater so that these units will able to fire at their design maximum firing rates. This change will eliminate the requirement for fuel gas flow monitor testing to demonstrate that these heaters operate at the sub-design firing rates specified in the current permit. Note that this action is being requested solely to eliminate the need for annual fuel gas flow meter testing.
- Installation of a new Naphtha Splitter and Benzene Saturation/Isomerization (BSI) Unit to provide the capability to reduce the benzene content in the refinery's gasoline product to meet the specifications of the February 2007 Mobile Source Air Toxics II (MSAT II) rule. This potential project is totally unrelated to the Crude Oil Optimization Project. Depending on SWRC's success at meeting MSAT II requirements using the current refinery configuration, SWRC may elect to forego installing a new Naphtha Splitter and/or BSI unit.

- Upgrade of the refinery's sour water stripping system which will include increasing the capacity of the existing sour water stripping system and installation of an additional sour water stripper. Sour water is a byproduct of the refining process that refers to water containing hydrogen sulfide and ammonia. A sour water stripper removes the H₂S and Ammonia gases from sour water using steam heat. The gases then go to the refinery Sulfur Recovery Plants where 99+% of the sulfur is recovered as product sulfur. The stripped water is either used in other refining processes or goes to the refinery wastewater treatment plant for processing. The installation of the new sour water stripper will improve the refinery's ability for continuous sour water stripping and is included in the project description for completeness.
- Installation of a new emergency air compressor that will supply instrument air to the refinery in the event of a power failure.

A more detailed process description of the proposed project can be found in the permit application document.

1.2 Modeling Applicability and Pollutants to be Evaluated

SWRC is located in Carbon County and is designated as attainment or unclassifiable for all criteria pollutants and is a Class II PSD area as defined by U.S. EPA. The proposed project was evaluated to determine whether it triggers certain applicable requirements of the Clean Air Act (CAA), including the PSD requirements of 40 CFR Part 52.21. A PSD permitting applicability review was conducted for the proposed emission rate increases of CO, SO₂, NO_x, VOC, PM₁₀, and PM_{2.5}. The emission calculations provided in the air permit application demonstrate that the proposed project is subject to PSD permitting requirements for all but PM₁₀ and PM_{2.5}. These pollutants are still subject to state-level WAAQS review.

Additional state-level modeling was required for inhalation risk assessments for several HAPs. These analyses are discussed in Section 11.7.

SWRC contracted with Sage Environmental Consulting, L.P. (Sage) to prepare the pre-modeling protocol, conduct modeling, and to prepare the PSD modeling report for the project. The PSD modeling was conducted to evaluate potential impacts of the applicable criteria pollutant emissions associated with the proposed project to the ambient air. The PSD modeling was conducted according to the requirements of the U.S. EPA and WDEQ-AQD modeling guidelines and manuals^{2,3,4}.

A pre-modeling protocol was submitted to WDEQ-AQD on September 19, 2011. WDEQ-AQD provided comments to the pre-modeling protocol via electronic mail dated September 20, 2011 from Mr. Josh Nall -- NSR Program Principal, Dispersion Modeling. The items discussed in the

⁴⁰ CFR §52.21(c)(3)

² H.S. EPA, Guideline on Air Quality Models (Revised), Appendix W of 40 CFR, Part 51, EPA-450/2-78-027R, November 2005.

³ U.S. BPA, Draft New Source Review Workshop Manual. Prevention of Significant Deterioration and Nonattainment Area Permitting. U.S. 12PA, Office of Air Quality, October 1990.

⁴ WDEQ, WDEQ-AQD Major Source/PSD Modeling Guidance, January, 2010.

e-mail were agreed to be valid by SWRC and Sage and has incorporated Mr. Nall's comments into this modeling analysis.

1.2.1 General PSD Modeling Approach

The guidance for performing PSD air quality analyses is set forth in Chapter C of U.S. EPA's New Source Review Workshop Manual, Draft - October 1990, and in U.S. EPA's "Guideline on Air Quality Models", 40 CFR Part 51 Appendix W (referred to as the GAQM). These PSD modeling guidance documents address modeling for 1-hour and 8-hour CO; annual NO2; and 24-hour and annual PM₁₀ averaging periods.

Numerous changes in EPA requirements for PSD air quality analyses were promulgated in 2010 and 2011. These changes include:

- Updated PM_{2.5} modeling guidance^{5,6} issued on February 26 and March 23, 2010;
- Finalized Significant Impact Levels (SILs) and Significant Monitoring Concentration (SMC) for PM2.5 which became effective on December 20, 2010;
- Finalized PSD Increments for PM_{2.5} which become effective on October 20, 2011;
- A new 1-hour NO₂ National Ambient Quality Standard (NAAQS)⁷ which became effective on April 12, 2010;
- 1-hour NO₂ modeling guidelines^{8,9} released on June 29, 2010 and March 1, 2011;
- A new 1-hour SO₂ National Ambient Quality Standard (NAAQS) which became effective in June 2010;
- 1-hour SO₂ modeling guidelines released in August, 2010; and
- AERMOD User's Guide Addendum, March 2011.

In summary, SWRC is required to address compliance with the standards listed in the following Table I-1.

U.S. BPA, Review of Modeling Procedures for Demonstrating Compliance with PM25 NAAQS. EPA's SCRAM Web page

⁶ U.S. EPA, Madeling Procedures for Demonstrating Compliance with PM₂₅ NAAQS. Memorandum, March 23, 2010.

⁷ U.S. EPA, Primary National Ambient Air Quality Standards for NO₂. Federal Register V. 75 N. 26, February 9, 2010.

⁸ U.S. EPA, Guidance Concerning Implementation of the 1-hour NO2 NAAQS for the Prevention of Significant Deterioration

Program, Memorandum, EPA's New Source Review Policy & Guidance Web page, June 29, 2010.

⁹ U.S. EPA, Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO₂ NAAQS. Memorandum, IPA's New Source Review Policy & Guidance Web page, March 1, 2011.

Table 1-1

Pollutani	Averaging Period	Class II SIL (µg/m³)	Significant Monitoring Concentrations (µg/m³)	National Ambient Standards (NAAQS/ WAAQS) (ng/m²)	Class II PSD Increment (pg/m³)	Class I Sff, (µg/m³)	Class (PSD Increment (µg/m³)
NO	I-Hour	7.5*		188			
NO₂	Annual	E	14	100	25	0.1	2.5
	1-Hour	7.8*		195	••		
F.O.	3-Hour	25		1300	512	1.0	25
SO_2	24-Hour	5	13	365/260	91	0.2	5
	Amoal	1		80/60	20	0.1	2
PM_{to}	24-Hour	5	10	150	30	0.3	8
	Annoal	F			17	0.2	4
PM _{2.5}	24-Hour	1.2	4	35	9	0.07	2
	Annual	0,3		15	4	0.06	1
(20)	1-Hour	2,000		40,000	**		
co	8-Hour	500	575	10,000			

^{*}Notes: The 1-hour Class II NO₂ and SO₂ SILs are interim values published by EPA on June 29, 2010 and August 2010, respectively. The PM_{2.5} increments become effective October 20, 2011.

The following subsections describe the general approach discussed in U.S. EPA's New Source Review Workshop Manual, Draft - October 1990, with the changes recommended in the 2010 and 2011 EPA guidance documents.

1.2.2 Class I and II Area Significant Impact Analyses

Significant impact analyses estimate the ambient impacts from the proposed project (including contemporaneous emissions increases and decreases), for those pollutants with net actual emission increases above the Significant Impact Levels (SILs). The results of the significant impact analysis determine whether a cumulative impact analysis (including emissions from other nearby sources) must be performed. If the ambient impacts from the proposed project are less than the SIL for a particular pollutant and averaging period, then no additional modeling needs to be performed to meet Federal New Source Review (NSR) permitting requirements.

SILs for the PSD pollutants are presented above in Table 1-1. The 1-hour NO₂ SIL has not yet been finalized by EPA, therefore, as EPA has recommended, an interim NO₂ SIL equal to 4% of the NAAQS was used in the modeling demonstrations.

1.2.3 Class I and II Area Cumulative Impact Analyses

Cumulative impact analyses are performed to assess compliance with the applicable standard for any pollutant/averaging period for which the project results in significant impacts. These

analyses include NAAQS/WAAQS and PSD Increment for Class II areas. PSD Increment analyses for Class I areas were not required (see Section 11.6).

1.2.4 WDEQ-AQD Inhalation Risk Assessment

An inhalation risk assessment for Hazardous Air Pollutants (HAP) is required per WDEQ-AQD guidance. Per this guidance, a Tier I (screening level) analysis is performed to estimate the chronic carcinogenic risks for the project. The analysis follows the facility-specific assessment guidance developed by EPA as described in the document Air Toxics Risk Assessment Reference Library, Volume 2, Facility Assessment. The analysis uses the AERMOD model and base receptor grid per additional WDEQ-AQD guidance.

1.3 Model Design Concentrations

EPA has defined the dispersion model outputs or "design concentrations" that are compared to the SH.s, NAAQS/WAAQS, and PSD Increments. EPA also recommends in GAQM Section 8.3.1.2 that the air quality modeling analyses should evaluate either 5 years of National Weather Service meteorological data or at least 1 year of site-specific meteorological data. These analyses use 3 years of site-specific data (see Section 9 for details). Consequently, the modeled design concentrations are based on GAQM Section 7.2 recommendations and the recent EPA PM_{2.5} and 1-br NO₂ modeling guidance memos, as discussed below.

1,3.1 Significant Impact Analyses

For the Class If Area significant impact analyses, the modeled concentrations that were compared to the SILs are the highest concentrations over the proposed 3-year meteorological period.

For the Class I Area significant impact analyses, maximum AERMOD predictions at a distance of 50 km from the modeled sources in all directions were compared to the Class I Area SILs. This type of screening analysis was used to determine that CalPuff modeling is not necessary for the Class I PSD Increment analysis.

1.3.2 Cumulative NAAQS Analyses

The modeled design concentrations for the cumulative impact analyses are described below:

- For CO NAAQS, the 1-hour and 8-hour design concentration is the highest, second-highest concentration from each of the individual years that are modeled;
- For NO₂, the annual NAAQS design concentration is the highest of the annual averages calculated from each of the individual years. The 1-hour NO₂ NAAQS design concentration is the highest 98th percentile of the annual distribution of daily maximum 1-hour concentrations, averaged on a receptor-by-receptor basis across the number of years modeled. Alternatively, the highest, 8th-high (11811) value may be used initially, since it is more conservative than the 98th percentile of daily max 1-hour concentrations;
- For SO₂, the annual NAAQS design concentration is the highest of the annual averages
 calculated from each of the individual years. The 3-hour and 24-hour design values are

the highest, second-highest concentration from each of the individual years modeled. The 1-hour SO₂ NAAQS design concentration is the highest 99th percentile of the annual distribution of daily maximum 1-hour concentrations, averaged on a receptor-by-receptor basis across the number of years modeled. Alternatively, the highest, 4th-high (H4II) value may be used initially, since it is more conservative than the 99th percentile of daily max 1-hour concentrations:

- For PM₁₀, the 24-hour NAAQS design concentration is the "n+1" highest concentration over the "n" year modeling period (high 4th highest for the three year meteorological data set). The 24-hour PSD Increment design concentration is the highest, second-highest concentration calculated from each of the individual years that are modeled. The PSD annual increment design concentration is the highest of the individual annual averages; and
- For PM_{2.5}, the 24-hour and annual design concentrations were based on the latest EPA guidance memorandum titled "Modeling Procedures for Demonstrating Compliance with PM_{2.5} NAAQS", Steven Page, EPA OAQPS, March 23, 2010. For the 24-hour NAAQS design concentration, the highest 24-hour PM_{2.5} concentration was determined for each of the 3 years modeled. For conservatism, the highest 24-hour value over the entire 3 year period was selected as the design concentration. For the annual average NAAQS design concentration, the highest modeled annual concentration over the three years was considered as the design concentration.

1,3,3 PSD Increment Analyses

The Class II PSD Increments are maximum allowable increases in concentrations that may be exceeded once per year at each site, except for the annual increment which may not be exceeded at all. Therefore, for short-term averages the highest, second-highest short term average concentration for any year is the design concentration, and for annual averages the design concentration is the highest modeled annual average. For the Class I area PSD Increment analysis, the highest short term and annual concentration for any year will be the design concentration for comparison with the Class I increments.

A summary of the applicable Class I and II SILs, PSD Increments, and NAAQS is provided in Table 1-1.

1.4 Proposed Modeling Procedures for Individual Pollutants

The following Subsections 1.4.1 through 1.4.5 discuss the general modeling approach for each pollutant evaluated.

1.4.1 NO₂ 1-hour and Annual Modeling

The standard approach discussed in the U.S. EPA NSR Workshop Manual will be used for the annual NO₂ modeling.

For the 1-hour NO₂ analysis, the interim SIL proposed by the U.S. EPA is 4 ppb (approximately 7.5 µg/m³). A multi-step approach for NO₂ 1-hour average modeling was conducted.

1-6

SOLVAY2016_1.2_004673

Step 1 (Significant Impact Modeling). In the first step, all project-related and contemporaneous period increases and decreases were modeled. Full conversion from NO_x to NO₂ was assumed. The modeling was conducted on a receptor grid described in Section 8, using three years of onsite meteorological data. In this step, the maximum modeled value was compared to the SIL of 7.5 μg/m³ for the 1-hour average. A receptor grid containing all receptors with maximum modeled concentrations over the SIL was constructed for use in the Cumulative Impact Modeling. Additional discussion of the receptor grids to be used in cumulative impact analyses is provided in Section 8.

Step 2 (Cumulative Impact Modeling). In this step, on-site existing and off-site sources of NO_x were added to the modeling. A discussion regarding the development of the inventory of off-site sources is provided in Section 5.3. The eighth-highest maximum daily values were averaged over the three-year period on a receptor by receptor basis. The Ambient Ratio Method (ARM) was applied to adjust for conversion of NO_x to NO₂.

The monitored NO_2 background concentration described in Section 5.4 was added to the design values predicted from the Step 2 modeling. The results of the Step 2 modeling were added to the background concentration for comparison to the NAAQS/WAAQS. Compliance was shown at all receptors.

1.4.2 SO₂ Modeling

The standard approach discussed in the U.S. EPA NSR Workshop Manual was used for the annual, 3-hour and 24-hour SO₂ modeling.

For the 1-hour SO₂ analysis, the interim SIL proposed by the U.S. EPA is 4 ppb (approximately 7.8 µg/m³). A multi-step approach for SO₂ 1-hour average modeling was conducted.

Step 1 (Significant Impact Modeling). In the first step, all project-related and contemporaneous period increases and decreases were modeled. The modeling was conducted on a receptor grid described in Section 8, using three years of onsite meteorological data. In this step, the maximum modeled value was compared to the SIL of 7.5 μg/m³ for the 1-hour average. A receptor grid containing all receptors with maximum modeled concentrations over the SIL was constructed for use in the Cumulative Impact Modeling. Additional discussion of the receptor grids to be used in cumulative impact analyses is provided in Section 8.

Step 2 (Cumulative Impact Modeling). In this step, on-site existing and off-site sources of SO₂ were added to the modeling. A discussion regarding the development of the inventory of off-site sources is provided in Section 5.3. The fourth-highest maximum daily values were averaged over the three-year period on a receptor by receptor basis.

The monitored SO₂ background concentration described in Section 5.4 was added to the design values predicted from the Step 2 modeling. The results of the Step 2 modeling were added to the background concentration for comparison to the NAAQS/WAAQS. Compliance was shown at all receptors.

No receptors were shown to be significant for the annual SO₂ modeling. This analysis was deemed complete at this step and a full impact analysis was not performed.

1.4.3 CO 1-hour and 8-hour Average Modeling

The standard approach discussed in the U.S. EPA's NSR Workshop Manual (1990) was used for the CO modeling. As discussed in Section 11.3, the model predictions were below the NAAQS/WAAQS for both averaging periods.

1.4.4 PM₁₀ 24-hour and Annual Average Modeling

For PM₁₀ 24-hour and annual NAAQS and increment analyses, the modeling was conducted in agreement with the modeling procedures provided in the U.S. EPA's NSR Workshop Manual (1990). The highest, first-high model impacts from the project and contemporaneous sources were used in the significant impact modeling. As discussed in Section 11.4, the model predictions were below the SILs for both averaging periods; therefore, cumulative Full Impact and Increments analyses were not required for this pollutant.

1.4.5 PM_{2.5} 24-hour and Annual Average Modeling

Issues related to implementing the NSR program for PM_{2,5} were addressed in a memorandum dated March 23, 2009, *Modeling Procedures for Demonstrating Compliance with PM_{2,5} NAAQS*. The main issue was related to climination of the "PM₁₀ as a surrogate" policy in favor of an explicit PM_{2,5} analysis. The steps discussed in Section 1.4.1 (regarding 1-hour NO₂ modeling) were also utilized for the PM_{2,5} modeling, with the following modifications:

- In Step 1, the modeling results were compared to the SiLs established by the U.S. EPA on September 29, 2010 (i.e., 1.2 μg/m³ for 24-hour average and 0.3 μg/m³ for annual average);
- PM_{2.5} emissions were conservatively assumed equal to PM₁₀ emissions from all modeled sources except the FCCU Regenerator Vent;
- The design values for PM_{2.5} described in Sections 1.3.1 and 1.3.2 were utilized;
- The PM_{2.5} background concentrations described in Section 5.4 were used in the NAAQS analyses.

The highest, first-high model impacts from the project and contemporaneous sources were used in the significant impact modeling. As discussed in Section 11.5, the model predictions were below the SILs for the annual averaging period; therefore, cumulative Full Impact analyses were not required for this averaging time. A Full Impact analysis was conducted for the 24-hr averaging period. NAAQS/WAAQS compliance was shown at all receptors.

SECTION 2 MODEL SELECTION

The latest code (version 11103) of the U.S. EPA approved AERMOD model was used to predict pollutant concentrations. A commercial version of the model (BEEST for Windows by Bee-Line Software); was used as the modeling interface. In this analysis, modeling with AERMOD was performed using the regulatory default options, which includes stack heights adjusted for stack-tip downwash, buoyancy-induced dispersion, and final plume rise. Ground-level concentrations occurring during "calm" wind conditions are calculated by the model using the calm processing feature.

As discussed in Section 1, the new NO₂ and PM_{2.5} standards are probabilistic, which requires post-processing of initial modeling results to demonstrate compliance with the standards. The new AERMOD version fully incorporated in BEEST for Windows software includes processors to calculate the required statistical probabilities of NO₂ and PM_{2.5} concentrations as prescribed in the U.S. EPA's guidance^{10,11}. More details regarding the post-processing procedures are provided in Section 10.

2-1

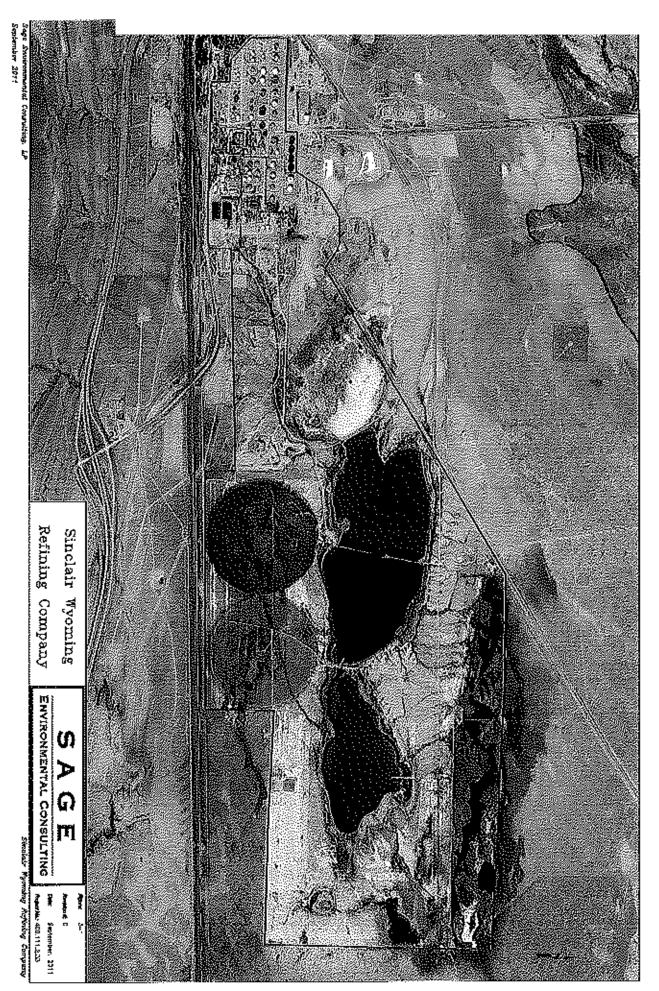
¹⁰ U.S. EPA, Notice Regarding Modeling for New Hourly NO2 NAAQN, Vebruary 25, 2010 (Updated).

¹¹ U.S. EPA, Modeling Procedures for Demonstrating Compliance with PM2,5 NAAQS, March 23, 2010.

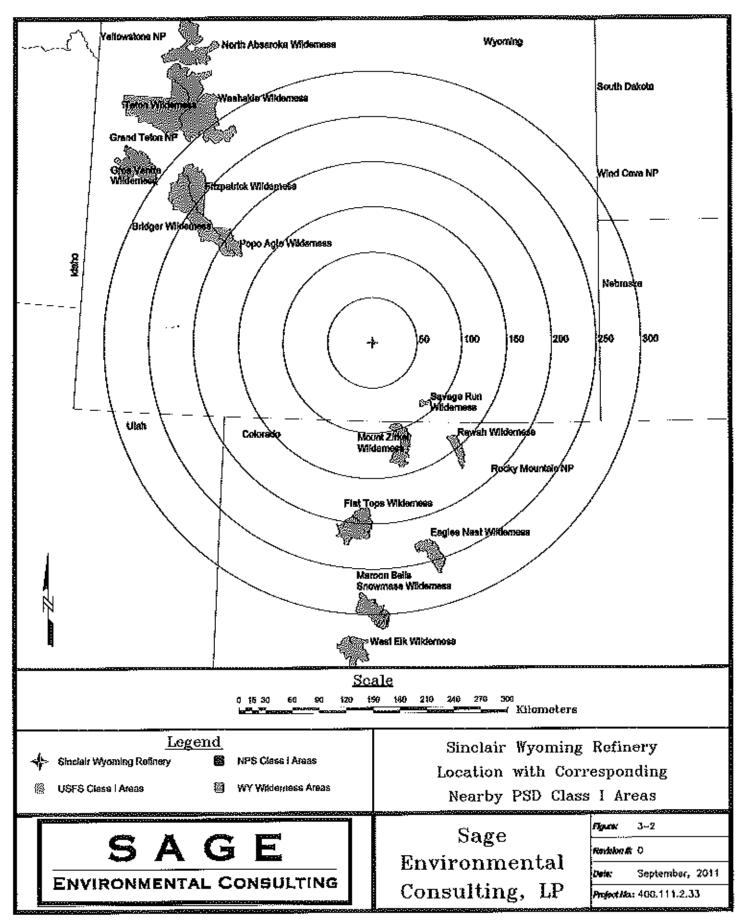
SECTION 3 SITE LOCATION

A drawing showing the SWRC ambient boundary overlaid on an aerial photo is shown in Figure 3-1.

An image showing the relative location of SWRC to the nearby Class I areas is depicted in Figure 3-2. The Class I areas nearest to the facility are the Savage Run Wilderness Area (75 kilometers) and the Mount Zirkel Wilderness Area (92 km). All other Class I areas are greater than 100 kilometers from SWRC.



SOLVAY2016_1.2_004678



Sage Environmental Consulting, LP September 2011 Sincluir Wyominy Refining Company

SECTION 4 PLOT PLAN

The equipment affected by this project is located at the existing SWRC refinery in Sinclair, Carbon County, Wyoming. All sources are located within the Ambient Air Boundary shown in Figure 3-1. This revised boundary was approved via an August 9, 2011 letter from WDEQ-AQD. The location of the emission sources and buildings relative to the boundary are shown in Figure 4-1.

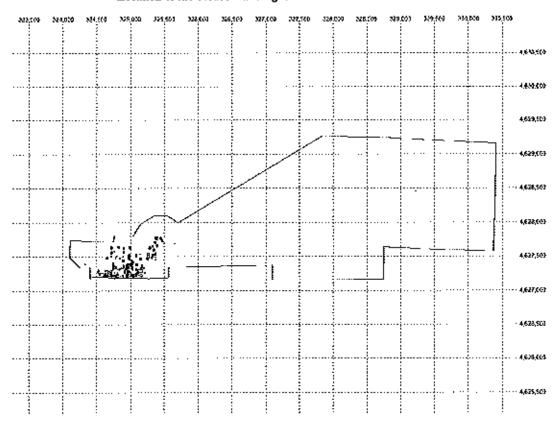
In all modeling input and output data files, the location of emission sources, structures, and receptors are represented in the Universal Transverse Mercator (UTM) coordinate system. All UTM coordinates used in the modeling are based on the North American Datum of 1927 (NAD27).

All emission units, buildings, structures, and property boundary locations digitized from plot plans and/or land surveys were converted to equivalent UTM coordinates. SWRC's rectangular buildings and structures and their corresponding UTM coordinates are presented in Appendix A.

4-1

Figure 4-1

Location of the SWRC Buildings and Sources Relative to the AAB



4-1

Sage Environmental Consulting, 1.1.
October 2011

Stacket Wyoming Reflaing Company Crude Oil Optimization Project Madeling Analysis

SECTION 5 MODELING EMISSIONS INVENTORY

SWRC evaluated and quantified hourly and annual emissions for all applicable pollutants associated with the project. Detailed emission calculations are provided in the permit application package.

Emission sources included in the modeling input files are specific to each type of modeling (i.e., Significant Impact; Cumulative Impact; PSD Increment, and Inhalation Risk Assessment, as applicable). The source selection is addressed in the following subsections, which provide a brief description of the modeling setup for the emission sources and the source groupings.

5.1 Significant Impact Modeling Sources

Significant Impact Modeling was conducted to determine the Significant Impact Area (SIA), i.e., the area in which receptors must be located to evaluate compliance with NAAQS and PSD Increment standards. The PSD Step 1 analyses were completed for NO₂, SO₂, CO, PM_{2.5}, and PM₁₀.

To determine whether Cumulative Impact Modeling, PSD Increment modeling, and/or pre-construction and post construction ambient air monitoring for NO₂, SO₂, CO, PM_{2.5} or PM₁₆ is required, modeling of emissions from the project related increases, as well as all emissions increases and decreases during the PSD contemporaneous period¹² was conducted to determine if the predicted concentrations equal or exceed the SiLs listed in Table 1-1 for each respective pollutant and averaging period. If a SiL was exceeded for a particular pollutant-averaging period combination, a significant impact area (SIA) was defined as all receptors with a design value that exceeds the SiL.

Tables showing the source parameters specific to each modeled source included in this step of the analysis are presented in Appendix B. These tables include UTM coordinates, emissions rates, and release parameters for each modeled pollutant and emission source.

5.2 Cumulative Impact Modeling - On-site Sources

NAAQS and PSD Increment Full Impact Modeling (FIM) analyses were conducted for the pollutants with significant impacts from the project and contemporaneous period sources. All on-site sources were included in this step of the modeling analysis at maximum permitted emission levels.

Tables showing the source parameters specific to each modeled source are presented in Appendix C. These tables include UTM coordinates, emissions rates, and release parameters for each modeled pollutant and emission source.

¹² New Source Review Workshop Manual. Prevention of Significant Deterioration and Nanattainment Area Permitting, Section C.IV.B. H.S. EPA, Office of Air Quality Planning and Standards. October 1990.

5.3 Camulative Impact Modeling - Off-property Sources and Parameters

The inventory of off-site sources was based on historical cumulative modeling analyses performed by SWRC as well as updated information recently provided by WDEQ-AQD.

Tables showing the source parameters specific to each modeled source are presented in Appendix C. These tables include UTM coordinates, emissions rates, and release parameters for each modeled pollutant and emission source.

5.4 Background Concentrations

Background concentrations for the NAAQS/WAAQS analyses were provided by WDEQ-AQD in their comments on the protocol, received via electronic mail on September 20, 2011. A summary of the background monitored values used in the analyses is provided in Table 5-1.

Table 5-1
Background Concentrations Used in Modeling

Back	erade Optimiza ground Concent WDEQ AP#122	rations
Polintant	Averaging Period	Background Concentration (µg/m³)
NO ₂	1-Hour Annual	32.1 5.7
50	I-Hour 3-Hour	20.8 15.6
SO₂	24-Hour Annual	5.2 2.7
PM _{2.5}	24-Hour Annual	9 4.2
PM ₁₀	24-Hour Annual	62 15

Notes:

- NO₂ background from 2008-2010 data from the AQD's Murphy Ridge site. 1-hour background: 3-year average of the 98th percentife of the daily maximums* (0.017 ppm); annual background: highest annual mean (0.003 ppm)
- 2) 1-Hour SO_2 background is the 99% percentile of the annual distribution of daily maximums (0.008 ppm) from the AOD's Wamsutter site for 2008-2009
- 3) 3-Hour SO₂ background is the 2nd high 3-hour (0.006 ppm) from the AQD's Wainsutter site for 2008-2009.
- 4) 24-1 four SO₂ background is the 2nd high 24-hour (0.002 ppm) from the AQD's Wamsutter site for 2008-2009
- 5) Annual SO, background is the highest annual mean (0.001 ppm) from the AQD's Wamsutter site for 2008-2009
- 6) 24-Hour PM_{25} background is the 3-year average of the 98^{th} percentile of the 24-hour averages** from the AQD's Chevenne site (2008-2010)
- 7) Annual PM_{2.5} background is the 3-year average of the annual means** from the AQD's Cheyenac site (2008-2010)

- 8) 24-Hour PM $_{10}$ background is the average of the highest 2^{ad} -high 24-hour averages from the AQD's Wamsutter site (2008-2010)
- Annual PM₁₀ background is the 3-year average of the named means from the AQD's Wamsutter site (2008-2010)
 - * per EPA memo Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-how NO_1 National Ambient Air Quality Standard (T. Fox, 1 Mat 11)
 - ** per EPA memo Modeling Procedures for Demonstrating Compliance with PM_{2.5}NAAQS (S. Page, 23 Mar 10)

SECTION 6 LAND USE AND TERRAIN

The land use within a 3-kilometer (km) radius of SWRC was evaluated using current aerial photo images and general knowledge of the area. Rural land use clearly prevails in the area; therefore, the AERMOD-default rural dispersion option was used in this air quality analysis.

The terrain option was used in the modeling to account for the elevation of the on- and off-site sources, receptors, and downwash structures. Base elevations of the facility emission sources, buildings, and all receptors will be obtained from a National Elevation Dataset (NED) file as described below.

An NED file was obtained from the United States Geological Survey (USGS) website¹³. The NED file is a NAD83 elevation file with heights measured in meters. The NED file was used to calculate elevations for all modeled objects (sources, structures, and receptors). A copy of the file is included on the DVD submitted with this report. The NED file has a resolution of 1-arc second.

The terrain elevations were imported into the AERMOD input file using the BEEST for Windows built-in processor that utilizes the latest version of EPA's AERMAP (version 11103) terrain preprocessing program.

¹³http://seamless.usgs.gov/index.php

SECTION 7 BUILDING WAKE EFFECTS (DOWNWASH)

Direction-specific building dimensions and the dominant downwash structure parameters used as input to the AERMOD model were determined using GEP/BPIP-PRIME (Good Engineering Practice/Building Profile Input Program for PRIME) program, version 04274.

Data input for each structure at SWRC was used by the BPIP-PRIME program to calculate the direction-specific downwash parameters. The BPIP-PRIME program generates the height, width and three additional downwash parameters for thirty-six compass directions for each structure with reference to each point source of emissions. BPIP-PRIME also takes into account the difference in the base elevation of the point source and the structure to determine the good engineering practice (GEP) stack height or the height at which the stack will not be affected by downwash from the structure.

The output from BPIP-PRIME contains a summary of the dominant structures for each emission unit (considering all wind directions) and the actual building heights, projected widths, and three additional parameters for 36 wind directions. This information was then incorporated into the input files for the AERMOD model using the BEEST for Windows Suite's built-in functions. The BPIP-PRIME input and output files are provided on a CD accompanying this modeling report.

BPIP structure information is also tabulated in Appendix A.

SECTION 8 RECEPTOR GRIDS

The following sections discuss the receptor grids that were used in the modeling analyses. All receptor coordinates have a datum of NAD27. The receptor elevations for all grids were evaluated using the BEEST for Windows software's built-in processor that utilizes the AERMAP program Version 11103, which processed the NED file covering the modeling domain.

8.1 Receptors for Class I Impact Modeling Analyses

A polar grid was used to conduct the Class I Significant Impact modeling analyses. A set of polar receptors was set up that are arranged in an arc (full circle), with 1 degree spacing, at a distance of 50 kilometers. The location and configuration of these receptors is shown in Figure 8-1.

8.2 Receptors for Class II Preliminary Modeling Analyses

For the criteria pollutant and inhalation risk modeling, the base receptor grid follows the WDEQ-AQD guidance for PSD modeling analyses. It consists of a grid containing:

- 50-m spacing along the facility ambient air boundary
- 100-m spacing from the ambient boundary to a distance of at 1.0 km
- 250-m spacing from 1.0 km to 3.0 km
- 500-m spacing from 3.0 km to 10.0 km
- 1000-m spacing from 10.0 km to 25.0 km

The size of the grid was sufficient in all cases to establish the significant receptors. The location and configuration of these receptors are shown in Figures 8-2 and 8-3.

8.3 Receptors for Class II Cumulative Impact and Increment Modeling Analyses

For Class II Cumulative and Increment modeling analyses, receptor grids were built containing only those receptors exceeding the SIL for each pollutant and averaging time. These reduced receptor grids are shown in Figures 8-4 through 8-11 below.

Figure 8-1
Receptor Grid for Class I Area Modeling

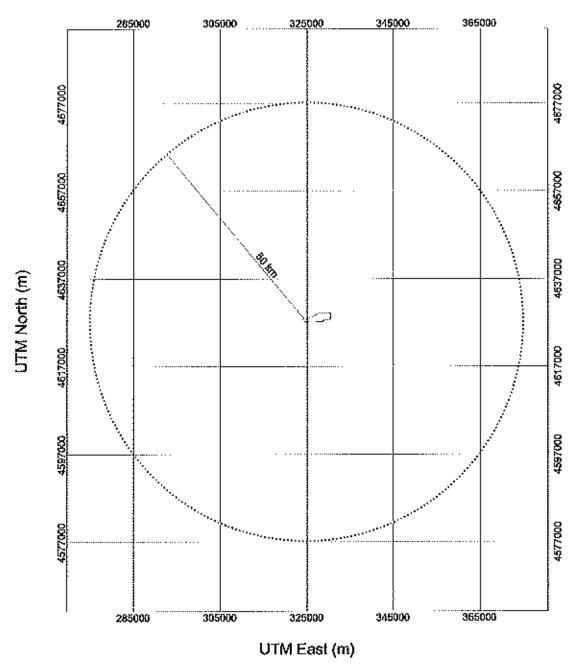
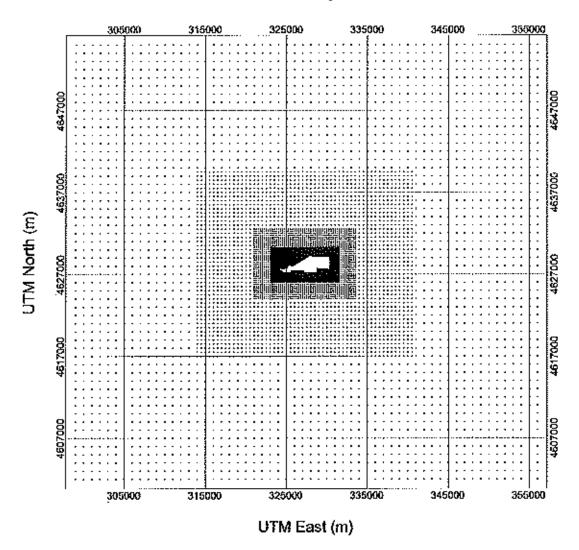


Figure 8-2 Initial Base Receptor Grid



8-3

Figure 8-3
Initial Receptor Grids for Class II Area Modeling (Fenceline Area)

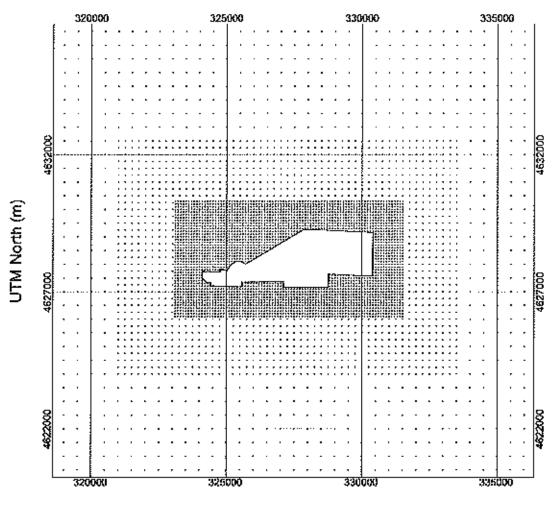


Figure 8-4
Reduced Receptor Grid for Cumulative 1-hr NO₂

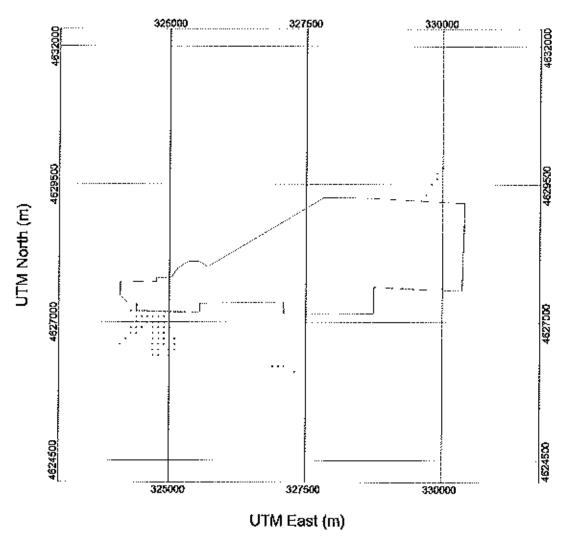


Figure 8-5 Reduced Receptor Grid for Cumulative Annual NO_2

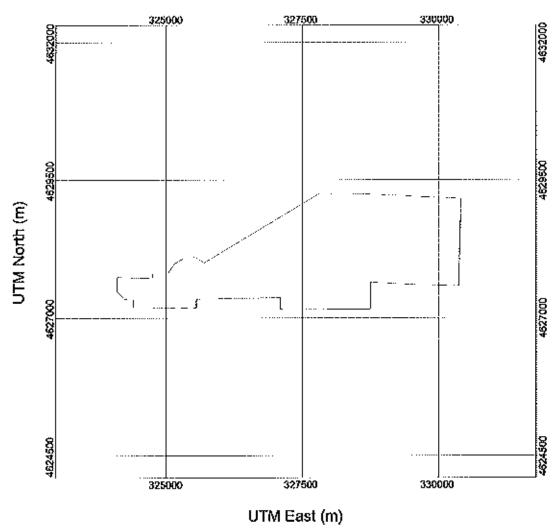


Figure 8-6
Reduced Receptor Grid for Cumulative 1-hr SO₂

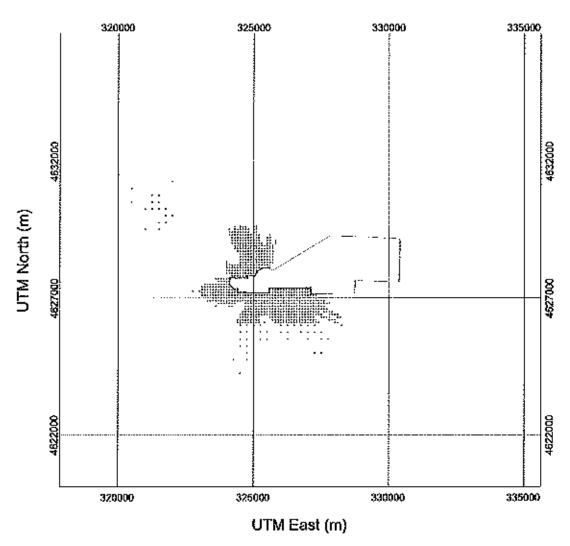
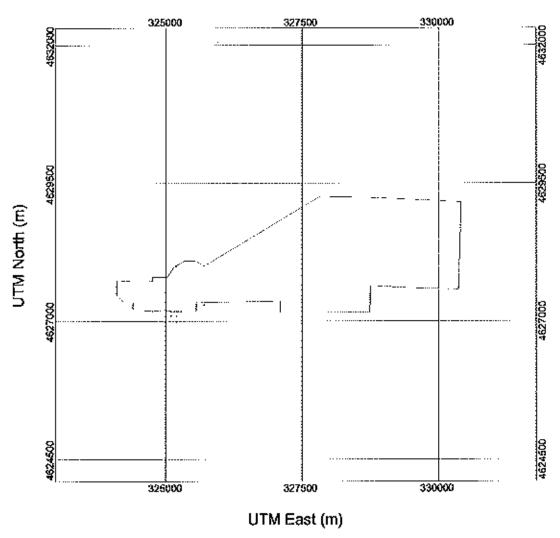


Figure 8-7
Reduced Receptor Grid for Cumulative 3-lar SO₂



325000 327500 330000 0002594

Figure 8-8
Reduced Receptor Grid for Cumulative 24-hr SO₂

. Figure 8-9 Reduced Receptor Grid for Cumulative 24-hr PM₁₀

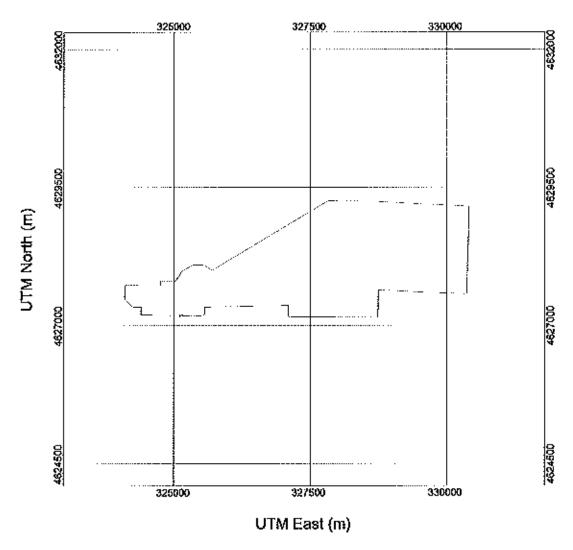


Figure 8-10
Reduced Receptor Grid for Cumulative 1-hr CO

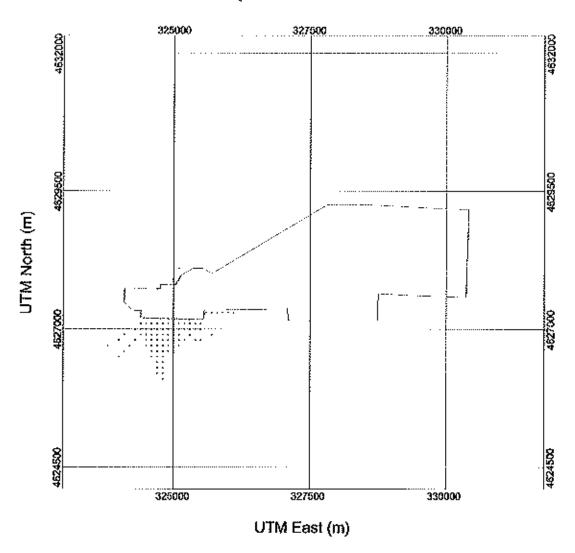
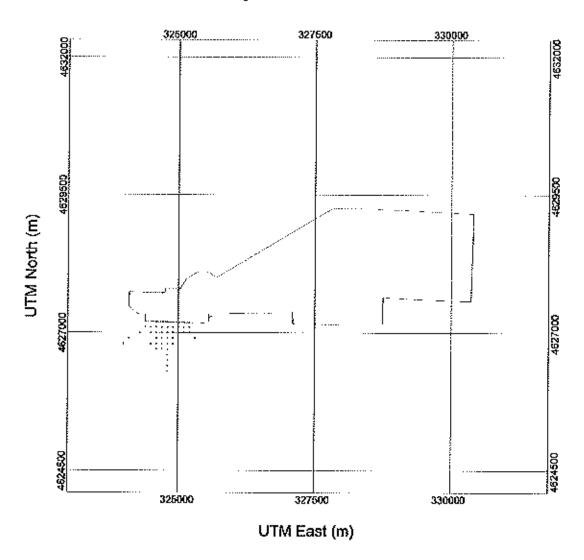


Figure 8-11
Reduced Receptor Grid for Cumulative 8-hr CO



SECTION 9 METEOROLOGICAL DATA

The AERMOD modeling analyses discussed in this report used 3 years of onsite meteorological data recently approved by WDEQ-AQD. The following is a summary of the processing prepared by WDEQ-AQD:

Sinclair is conducting meteorological monitoring at the SWRC refinery to collect data suitable for air quality modeling. Monitoring began in September of 2007, and the period of record for the AERMET processing for this project spanned the 3-year period from January 1, 2008 through December 31, 2010. Sinclair conducted the monitoring according to the plan that was submitted to (and approved by) the Division titled Sinclair Wyoming Refining Company — Meteorological Monitoring Plan (ENSR Corporation, August 2008). The monitoring station is located at the coordinates shown below:

- 41.785°N, 107.115°W (NAD 83)
- UTM: 324,235 m E; 4,628,059 m N (NAD 83, Zone 13)

The meteorological tower is instrumented at multiple levels;

- Ambient temperature (2 meters, 10 meters, 30 meters)
- Wind speed and direction (10 meters, 30 meters)
- Total solar radiation (2 meters)
- Barometric pressure (2 meters)
- Vertical temperature difference (between 2-10 meters and 2-30 meters)
- Vertical wind speed and vertical wind speed standard deviation (30 meters)

Upper-air data is needed by AERMET to represent the temperature structure aloft. For this project, the nearest upper-air data were available from the National Weather Service (NWS) station in Riverton, Wyoming. The AERMET preprocessor was used to combine the surface data and upper-air data into a format suitable to drive the AERMOD model.

Data from the NWS Automated Surface Observing System (ASOS) station in Rawlins, Wyoming, located approximately five miles west of the Sinclair refinery, were used to substitute for missing data from the refinery. The AERMET processing included the use of I-minute ASOS wind data from Rawlins. These I-minute files are used to reduce the number of calm/missing hours that result from the use of the standard surface files that utilize a single observation to represent a given hour. AERMET and the AERMINUTE processor (both version 11059), which are capable of averaging the 1-minute ASOS data for each hour, were used to produce the datasets described here.

Stage 3 of AERMET processing (also called the METPREP stage) requires the input of surface characteristics of the areas from which the surface meteorological data were collected. These surface characteristics, which are used by AERMET to determine heat fluxes and almospheric stability, include:

midday albedo – fraction of solar radiation reflected at the surface

- daytime Bowen ratio indicator of surface moisture
- surface roughness length—height of obstacles to the wind flow

Seasonal values of surface roughness, Bowen ratio and midday albedo were determined using the EPA AERSURFACE program (08009). This program, which was released in January of 2008, makes use of electronic land cover data from the U.S. Geological Survey to automatically calculate surface characteristics for a given modeling domain.

An AERSURFACE user has the option of choosing Bowen ratios that are tailored for dry, average, or wet conditions. Based on available precipitation data from the Rawlins area, the Division chose "average" moisture conditions for each of the three years of data that were processed. Given that the fong-term average annual precipitation total at Rawlins is approximately 9.0 inches per year, the area was classified as "arid" for AERSURFACE processing. Seasonal classifications for the twelve months of the year followed the standard AERMET/AERSURFACE breakdown (e.g. spring = March, April, and May only).

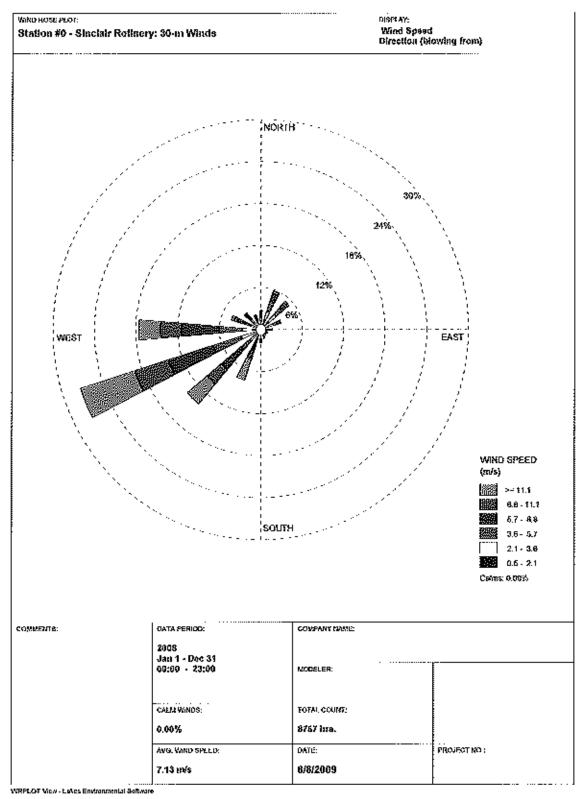
For final calculation of heat fluxes and stability in Stage 3 of AERMET, the Division chose the Bulk Richardson method. This method prompts AERMET to make use of the temperature difference measurements that were collected at the refinery. Wind roses for the 10-meter and 30-meter levels are presented in Figures 1 and 2.

9.2

CISPLAY: Wind Speed Direction (blowing from) WIND ROSE PLOT: Station #72574 12% EAST WEST WIND SPEED (m/s) 2.5 - 3.6 0.5 - 2.1 Cs4ma; 0.00% COMPANY NAME: COMMENTS: UNITA PERIOD: 2008 Jan 1 - Dec 31 00:00 - 23:00 MODELER: сим паказ: TOTAL COURT: 0.00% 8764 isra. AVO. MIND SPEED: DATE: PROJECENO: 5.91 m/s 7/29/2011 WPP OF Vays - Enhant Embornation Software

Figure 1: 10-Meter Wind Resc

Figure 2: 30-Meter Wind Rose



SECTION 10

MODEL REFINEMENTS AND POST-PROCESSING

While the new 1-hour NAAQS is defined relative to ambient concentrations of NO₂, the majority of nitrogen oxides (NO₈) emissions for stationary and mobile sources are in the form of nitric oxide (NO) rather than NO₂. In addition, the new standard for NO₂ is attained when the 3-year average of the 98th-percentile of the annual distribution of daily maximum 1-hour concentrations does not exceed the threshold value of 100 parts-per-billion. As a result, special techniques discussed below were used to demonstrate compliance of SWRC operations with the new standards.

10.1 NO2 Modeling Options

The U.S. EPA's NO₂ modeling memorandum¹⁴ and clarification¹⁵ provide four main options for I-hour averaging period modeling for NO₂:

- Tier 1 Regulatory default modeling assuming full conversion of NO to NO₂;
- Tier 2 (Ambient Ratio Method, aka ARM) Regulatory default modeling with Tier I results multiplied by empirically-derived NO₂/NO_x annual national default ratio of 0.75. The March 1, 2011 EPA memorandum authorized using the 1-hour NO₂/NO_x default ratio of 0.8.
- Tier 3A (Ozone Limiting Method, aka OLM) non regulatory default beta option;
- Tier 3B (Plume Volumetric Molar Ratio Method, aka RVMRM) non regulatory default beta option.

Tier 2 option was used in the 1-hour and annual NO₂ modeling. Note that the chemical name used for NO_x in the cumulative modeling analyses was "NO2". This name convention was selected because this is the chemical ID used by the new AERMOD software (ver. 11103) to complete special treatment of the model predictions (e.g., averaging periods). However, the modeled emission rates were for NO_x; therefore, the Tier 2 adjustments were applied to the model-calculated values.

¹⁴ U.S. EPA, Applicability of Appendix IV Modeling Guidance for the 1-hour NO₂ NAAQS, Memorandum, Office of Air Quality Phonoisis and Standards, June 28, 2010.

¹⁵ U.S. UPA, Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO₂ NAAQS, Memorandum, EPA's New Source Review Policy & Guidance Web page, March 1, 2011.

SECTION 11 MODELING RESULTS AND SUBMITTALS

The modeling results for each pollutant and averaging period are summarized in the following subsections of this section. Tables comparing the design concentrations for each averaging period for each pollutant to the applicable significance level, PSD Increment, and NAAQS are included in this section or in Appendices B through F, as referenced. Also included in Appendix D are figures showing the location of the Cumulative NAAQS/WAAQS results.

A digital video disk (DVD) accompanying this report contains all model input and output files, as well as meteorological data electronic files pertinent to the modeling analyses, terrain files, downwash files, and supporting information files.

11.1 Modeling Results for NO₂

A Significant Impact Analysis was performed for 1-hour and annual NO₂ as discussed in Section 1.4. Three years of onsite meteorological data were used, as was the full base receptor grid. Maximum modeled concentrations over the three year period (assuming full conversion of NO_x to NO₂) were compared for each receptor to the SHs. One receptor for the annual averaging period and 94 receptors for the 1-hour averaging period were found to exceed the Class II SHs. These receptors were then included in the NAAQS/WAAQS cannulative analysis. Figures depicting these reduced receptor grids can be found in Section 8.

A Cumulative Modeling Analysis was performed using the reduced receptor grids, the three years of meteorological data, and an emissions inventory including all onsite and surrounding offsite sources modeled at their maximum PTEs.

The highest-eight highest maximum daily value averaged over the three years, adjusted using the ARM (0.8) plus background 1-hour ambient air concentration for NO₂ is 132.5 μg/m³, or approximately 70% of the NAAQS (188 μg/m³). Since no PSD Increment standard has been established for this averaging period, the demonstration is complete.

The highest adjusted (ΛRM) plus background annual ambient air concentration for NO₂ (Year 2009) is 15.7 μg/m³, or approximately 16% of the NAAQS (100 μg/m³). The highest adjusted predicted concentration without background is 10.0 μg/m³, or approximately 40% of the PSD Increment standard (25 μg/m³). Since all sources were modeled with the Potential-to-Emit rates, no additional demonstration is required to document that the PSD Increment will not be violated.

Full NO₂ modeling results can be found in the tables in Appendix D.

11.2 Modeling Results for SO₂

A Significant Impact Analysis was performed for 1-hour, 3-hour, 24-hour and annual SO₂ as discussed in Section 1.4. Three years of ensite meteorological data were used, as was the full base receptor grid. Maximum modeled concentrations over the three year period were compared for each receptor to the SiLs.

No receptors exceeded the SIL for the annual average. Therefore, no cumulative NAQQS/WAAQS or Increment analyses were required.

41 receptors for the 24-hour averaging period, 28 receptors for the 3-hour averaging period and 917 receptors for the 1-hour averaging period were found to exceed the Class II SILs. These receptors were then included in the NAAQS/WAAQS cumulative analysis. Figures depicting these reduced receptor grids can be found in Section 8.

A Cumulative Modeling Analysis was performed using the reduced receptor grids, the three years of meteorological data, and an emissions inventory including all onsite and surrounding offsite sources modeled at their maximum PTEs.

The highest-fourth highest maximum daily value averaged over three years plus background 1-hour ambient air concentration for SO_2 is $102.0 \,\mu\text{g/m}^3$, or approximately 52% of the NAAQS (195 $\,\mu\text{g/m}^3$). Since no PSD Increment standard has been established for this averaging period, the demonstration is complete.

The highest-second highest plus background 3-hour ambient air concentration for SO_2 (Year 2009) is 97.1 μ g/m³, or approximately 7.5% of the NAAQS (1300 μ g/m³). The highest-second highest predicted concentration without background is 81.5 μ g/m³, or approximately 16% of the PSD Increment standard (512 μ g/m³). Since all sources were modeled with the Potential-to-Emit rates, no additional demonstration is required to document that the PSD Increment will not be violated.

The highest-second highest plus background 24-hour ambient air concentration for SO₂ (Year 2010) is 62.3 µg/m³, or approximately 24% of the WAAQS (260 µg/m³). The highest-second highest predicted concentration without background is 57.1 µg/m³, or approximately 63% of the PSD Increment standard (91 µg/m³). Since all sources were modeled with the Potential-to-Emit rates, no additional demonstration is required to document that the PSD Increment will not be violated.

Full SO₂ modeling results can be found in the tables in Appendix D.

11.3 Modeling Results for CO

A Significant Impact Analysis was performed for 1-hour and 8-hour CO as discussed in Section 1.4. Three years of onsite meteorological data were used, as was the full base receptor grid. Maximum modeled concentrations over the three year period were compared for each receptor to the SILs.

120 receptors for the 1-hour averaging period and 66 receptors for the 8-hour averaging period were found to exceed the Class II SILs. These receptors were then included in the NAAQS/WAAQS cumulative analysis. Figures depicting these reduced receptor grids can be found in Section 8.

A Cumulative Modeling Analysis was performed using the reduced receptor grids, the three years of meteorological data, and an emissions inventory including all onsite and surrounding offsite sources modeled at their maximum PTEs.

The highest-second highest 1-hour ambient air concentration for CO (Year 2010) is 12,517 μg/m³, or approximately 31% of the NAAQS (40,000 μg/m³). No background concentration was provided for 1-hour CO. Given the relatively low (31% of the standard) maximum modeled concentration, it is extremely unlikely that adding a background value to this concentration it would approach the NAAQS. Additionally, there are no Increment standards in place for CO. Therefore, this analysis was deemed complete.

The highest-second highest 8-hour ambient air concentration for CO (Year 2009) is 4,800 μg/m³, or approximately 48% of the NAAQS (10,000 μg/m³). No background concentration was provided for 8-hour CO. Given the relatively low (48% of the standard) maximum modeled concentration, it is extremely unlikely that adding a background value to this concentration it would approach the NAAQS. Additionally, there are no Increment standards in place for CO. Therefore, this analysis was deemed complete.

Full CO modeling results can be found in the tables in Appendix D.

11.4 Modeling Results for PM₁₀

A Significant Impact Analysis was performed for 24-hour and annual PM₁₀ as discussed in Section 1.4. Three years of onsite meteorological data were used, as was the full base receptor grid. Maximum modeled concentrations over the three year period were compared for each receptor to the SILs.

No receptors exceeded the SIL for the 24-hour or annual averaging periods. Therefore, no cumulative NAQQS/WAAQS or Increment analyses were required.

Full PM₁₀ modeling results can be found in the tables in Appendix D.

11.5 Modeling Results for PM_{2.5}

A Significant Impact Analysis was performed for 24-hour and annual PM_{2.5} as discussed in Section 1.4. Three years of onsite meteorological data were used, as was the full base receptor grid. Maximum modeled concentrations over the three year period were compared for each receptor to the SH.s.

No receptors exceeded the SIL for the annual average. Therefore, no cumulative NAQQS/WAAQS or increment analyses were required.

Two receptors for the 24-hour averaging period were found to exceed the Class II SIL. These receptors were then included in the NAAQS/WAAQS cumulative analysis. Figures depicting this reduced receptor grid can be found in Section 8.

A Cumulative Modeling Analysis was performed using the reduced receptor grid, the three years of meteorological data, and an emissions inventory including all onsite and surrounding offsite sources modeled at their maximum PTEs.

The maximum modeled plus background 24-hour ambient air concentration for PM_{2.5} (Year 2009) is 15.00 μ g/m³, or approximately 43% of the NAAQS (35 μ g/m³). The maximum modeled concentration without background is 6.00 μ g/m³, or approximately 67% of the PSD

Increment standard $(9.0 \,\mu\text{g/m}^3)$. Since all sources were modeled with the Potential-to-Emit rates, no additional demonstration would be required to document that the PSD Increment will not be violated. PM_{2.5} increments do not become effective until October 20, 2011. Therefore, this analysis is not applicable.

Full PM_{2.5} modeling results can be found in the tables in Appendix D.

11.6 Modeling Results for Class I Area SID

For the Class I Area Significant Impact modeling, emissions were modeled from all project related sources as well as emissions increases and decreases over the contemporaneous period. Maximum AERMOD predictions at a distance of 50 km from the modeled sources in all directions were compared to the Class I Area SILs.

The highest annual NO_x (unadjusted) concentration at the distance of 50 km from the project sources is 0.00 $\mu g/m^3$, or 0% of the Class I SIL (0.1 $\mu g/m^3$). Since the concentration at 50 km from the project sources is less than the SIL, the modeling indicated that the project will not create any threat to the PSD Increment standard at the Class I areas.

The highest annual SO₂ concentration at the distance of 50 km from the project sources is 0.00 μg/m³, or 0% of the Class I SIL (0.1 μg/m³). Since the concentration at 50 km from the project sources is less than the SIL, the modeling indicated that the project will not create any threat to the PSD Increment standard at the Class I areas.

The highest 24-hour SO_2 concentration at the distance of 50 km from the project sources is 0.003 $\mu g/m^3$, or 1.4% of the Class I SIL (0.2 $\mu g/m^3$). Since the concentration at 50 km from the project sources is less than the SIL, the modeling indicated that the project will not create any threat to the PSD Increment standard at the Class I areas.

The highest 3-hour SO₂ concentration at the distance of 50 km from the project sources is 0.043 µg/m³, or 4.3% of the Class I SIL (1.0 µg/m³). Since the concentration at 50 km from the project sources is less than the SIL, the modeling indicated that the project will not create any threat to the PSD Increment standard at the Class I areas.

The highest predicted 24-hour PM₁₀ concentration at the distance of 50 km from the project sources is $0.00~\mu g/m^3$, or 0% of the Class I SIL ($0.3~\mu g/m^3$). Since the concentration at 50 km from the project sources is less than the SIL, the modeling indicated that the project will not create any threat to the PSD Increment standard at the Class I areas.

The highest predicted annual PM_{10} concentration at the distance of 50 km from the project sources is 0.00 $\mu g/m^3$, or 0% of the Class I SIL (0.2 $\mu g/m^3$). Since the concentration at 50 km from the project sources is less than the SIL, the modeling indicated that the project will not create any threat to the PSD Increment standard at the Class I areas.

The highest predicted 24-hour PM_{2.5} concentration at the distance of 50 km from the project sources is $0.00 \,\mu\text{g/m}^3$, or 0% the Class t SIL $(0.07 \,\mu\text{g/m}^3)$. Since the concentration at 50 km from the project sources is less than the SIL, no further demonstration is required. Note that the Class I Increments for PM2.5 do not come into effect until October 20, 2011.

The highest predicted Annual PM_{2.5} concentration at the distance of 50 km from the project sources is $0.00~\mu g/m^3$, or 0% the Class I SIL ($0.06~\mu g/m^3$). Since the concentration at 50 km from the project sources is less than the SIL, no further demonstration is required. Note that the Class I Increments for PM2.5 do not come into effect until October 20, 2011.

Full Class I modeling results can be found in the tables in Appendix F.

11.7 WDEO-AOD Inhalation Risk Assessment

An inhalation risk assessment for Hazardous Air Pollutants (HAP) from project related sources was performed. Per WDEQ-AQD guidance, a Tier I (screening level) analysis was performed to estimate the chronic carcinogenic risks for the project. The analysis followed the facility—specific assessment guidance developed by EPA as described in the document Air Toxics Risk Assessment Reference Library, Volume 2, Facility Assessment. The analysis used the AERMOD model and base receptor grid per additional WDEQ-AQD guidance.

The AERMOD dispersion model was used along with the three years of onsite meteorological data to determine the highest predicted ambient air concentration per unit of mass emission rate for the annual averaging period (X/Q). This analysis applied the same downwash parameters and receptor grid as the Significant Impact analyses described above.

Table E-2 presents the model results (X/Q) for each HAP source. The X/Q value was multiplied by the emission rate for each HAP in Table E-1 to determine a maximum predicted ambient air concentration as shown in Table E-3.

Carcinogenic risks were assessed using the dispersion modeling described above and numerical values of toxicity provided in Table E-4. This method only assesses risks associated with the inhalation pathway. Cancer risk was assessed for each pollutant by dividing the maximum predicted annual ambient air concentration by the unit risk factor. This quotient is then multiplied by one million to yield the maximum predicted increase in cancer risk per million within the receptor grid. The indices for each pollutant and source were summed to determine the overall cancer risk.

Table E-5 presents the cancer risk assessment results. The calculated cancer risk was 1.0 per million. This predicted risk is equal to the established health risk assessment significance threshold. However, given the conservative nature of this analysis (that an individual would be exposed to the maximum concentrations continuously for 70 years) we believe this number shows insignificance and compliance with this requirement.

Individual risks for each pollutant and source are presented in Table E-5.

SECTION 12 ADDITIONAL IMPACTS ANALYSES

PSD rules require special analyses related to protection of the environment.

12.1 Visibility, Soils, and Vegetation

Additional impact analyses are required for PSD permit applications. The three types of additional impacts analyses are growth, soils and vegetation, and visibility.

12.1.1 Growth Analysis

Per the U.S. EPA Guidelines¹⁶, a growth analysis is required only "if the project would result in a significant shift of population and associated activity into an area—that is, a population increase on the order of thousands of people." Temporary increase in the local population may occur only during the construction period of this project; however, the project will not result in a significant population shift or increase. The number of net new jobs in the community will not result in a significant shift of population. Therefore, a growth analysis is not required.

12.1.2 Soils and Vegetation Analysis

A search was conducted for information regarding soils and vegetation in the vicinity of SWRC. The most recent analysis was done by the Bureau of Land Management (BLM) in support of the Chokecherry and Sierra Madre Draft EIS (BLM, 2011) ¹⁷. The Chokecherry project area is located approximately 2 miles directly south of SWRC. Excerpts from this document are provided below:

"The most commonly encountered soils in the Chokecherry area include the Rentsac, Blazon, and Diamondville series. The Rentsac series occurs on mountains, escarpments, bedrock-floored plains, and hills. Slopes range from 10 to 70 percent. Rentsac soils are shallow to calcareous sandstone with loamy-skeletal textures. Water crossion potential is high and wind crossion potential is moderate. Topsoil suitability is poor due to large stones. The Blazon series is shallow to shale bedrock and occurs on pediments, hillslopes, plateaus and ridges. Slopes range from 6 to 40 percent. The Blazon series is calcareous and is also compaction prone when moist or saturated. Water crossion potential is high and wind crossion potential is moderate. Topsoil suitability is good. The Diamondville series consists of moderately deep, well drained soils that formed in alluvium and residuum weathered from calcareous loamstone and sandstone. Diamondville soils are on fan remnants, plateaus, hills and ridges of cold intermountain basins. Slopes range from 3 to 70 percent. Water crossion potential is severe and wind crossion potential is slight. Topsoil suitability is fair due to high clay."

"A majority of the Chokecherry portion of the Application Area is mapped as rolling sagebrush steppe. The rolling sagebrush steppe is a semiarid region of unglaciated plains and hills, featuring

¹⁶ U.S. EPA, Draft New Source Review Workshop Manual. Prevention of Significant Deterioration and Nonattainment Area Permitting, U.S. EPA, Office of Air Quality, October 1990. Chapter D, Additional Impact Analyses.

¹⁷ BLM, Chokecherry and Sierra Madre Wind Energy Project DEIS, BLM, accessed online: http://www.blm.gov/wy/st/en/info/NEPA/documents/sfo/Chokecherry.html, September, 2011. Chapter 3, Affected Environment.

primarily ophomoral drainages. The potential natural vegetation in this ecoregion is fisted as western wheatgrass (Elymus smithii), needle-and-thread (Stipa comata), blue grama (Boutelona gracilis), Sandberg bluegrass (Poa secunda), prairie junegrass (Koeleria macrantha), various species of rabbitbrush (Chrysothamnus sp. and Ericameria nauseosa), fringed sage (Artemisia frigida), Wyoming big sagebrush (Artemisia tridentata var. wyomingensis), silver sagebrush (Artemisia cana) and black sagebrush (Artemisia nova) in lowlands, and mountain big sagebrush (Artemisia tridentata var. vaseyana) in higher elevation uplands (Chapman et al. 2004)."

None of the above listed soils or vegetation are identified as being sensitive. Presented below is Table 12-1, containing vegetation exposure screening thresholds.

Table 12-1 Vegetation Exposure Screening Thresholds

Pollutant	Averaging Period	Sensitive Vegetation Threshold Value (µg/m3)	Intermediate Vegetation Threshold Value (µg/m3)	Resistant Vegetation Threshold Value (µg/m3)
	1-hour	917		
SO ₂	3-hour	786	2,096	13,100
	Annual	18	18	18
	4-hours	3,760	9,400	16,920
NO ₂	8-hours	3,760	7,520	15,040
1402	1 month	564	564	564
	Annual	94-188	94-138	94-188
со	1 week	1.8x10 ⁶	777	1.8×10⁵

Source: A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils, and Animals (EPA 450/2-81-078), dated 12/12/1980.

Based on the results of the NAAQS/WAAQS modeling presented in Section 11, none of the Vegetation Exposure Screening Thresholds will be exceeded by the project. Therefore, there should be no detrimental effect to soils or vegetation in the area.

12.2 Class I Area AQRVs

A Class I PSD Area is defined as either:

- International park
- National wilderness area greater than 5,000 acres
- National memorial park greater than 5,000 acres
- National park greater than 6,000 acres

The nearest Class I area to SWRC is the Savage Run Wilderness Area, which is approximately 75 kilometers from the location of the project sources.

Per the Federal Land Managers' Air Quality Related Values Workgroup (FLAG) guidance, Class I visibility and Air Quality Related Values (AQRV) analyses must be conducted if the sum of the PM_{HI}, SO₂, and NO_x emission increases from the project, in tons per year (tpy) exceeds 10D, where D is the distance in kilometers from the source. A full Q/D analysis and request for determination of need for an analysis has been submitted by SWRC to WDEQ-AQD and was forwarded on to the appropriate Federal Land Managers (FLMs). It was determined, by all affected agencies, that no Class I AQRV impact will be required for this project.

APPENDIX A BPIP STRUCTURE INFORMATION

The following attachments are included in this appendix in the following order:

- Table A-1: Location and Parameters of Rectangular and Polygonal Structures
- Table A-2: Location and Parameters of Circular Structures

Table A.1 Sinstair Wyonding Religing Company

1.0045ion and Parameters of Rectangular and Polygonal Structures

Streeture	No. of				٠	•••	No. of	50.4006	C'henze 1	43mare 3	430.40.25	Courted	Course 1	Chantel	Constant	10	F C	C	C		C	C	A 4
Name	Elem	Tior No.	Tites	II:1gbs	Hang I	liyatim	Coaccas		North (V)														North (1)
		<u>_</u>	(m) ((0)	- GO	(0)	1111111	[20]	(m)	(m)	(m)	(0)	(m)	(m)	(m)	(m)	(m)	cm)	(0)	(0)	{n#	(4)	. 50
DEEKG1			396	53	2000	69921	1	324,553	4,617,243	324,552	4,677,755	124,505	4,677,255	024,595	4,637,248		, , ,						11.5
BLOXE	1		7.92	26	7008	6990.2	¥	384,614	6.627.7E8	324,614	4,627,276	324,648	4,623,236		1,627,218								
BLEK%	1	2	7,92	26	2000.	16591.5	į	323,625	3,627,290		4,627,237	321,696	1,627,237	321,678	1,627,210								
BLDGI	1	ŧ	7.92	26	apigr.	64390.1	1	32 0,663	1,627,258	321,643	1,621,212	321,693	1,621,252	321,093	1,627,238								
BERGS.	1.	5	9.26	30	1009.	6391.1	1	374,670	4,627,267	321,670	4,527,163	324,693	1,627,258	314,693	4,627,267				· · · · · · · · · · · · · · · · · · ·				
BLB(3)	1		732	24	1000	6591 2	4	324,710	4,627,265	322,710	4,627,397	314,727	4,627,307	335,737	4,627,365	l				l			1
ILUX:30	: 3	-	50 97	36	2003	566159.4	R	324,786	1,627,284	324,786	4,677,235	324,793	4,677,235	324,739	4,627,110	324,227	4,622,229	326,727	1,627,231	321,760	4662,2364	121,760	6,627,213
BLOGGI	1	Ŀ	9,84	.30)	2003	6992 5	+	124,746	1,627,372	321,716	4,627,352	121,725	1,627,352	321,775	4,627,302								
82.0X3F2		1	712	24	2002	6001.3	+	324,741	1,627,567	321,786	4,627,669	323,950	1,627,699	321,750	4,621,367								
SIEXTE	1		4,99	16	2000.	6302.4	•	321,765	4,627,338	321,783	1,621,333	12 (790	4,627,333	321,793	4,627,338								
ST DOLL	- 2	L	3.66	12	ZIKA.:	6390.2	1	321,996	4,621,232	324,916	4,627,314	324,943	4,627,314	324,943	4,627,281								
DEBG15	ŧ	L	7.32	15	2009.4	6591.6	4	324,932	4,627,330	324,931	4,627,346	324 943	1,627,346	วนุทร	4,627,330								†
ULDGt6	E	L	80.93	36	1009.	63731.6	4	324,937	4,627,355	334,937	4,637,371	125,749	4,627,371	174,949	1,677,145	· · · · · · · · - ·							
BLDGil7	2	1.	8.20	27	7000	t 659] 9	+ 1	124,957	4,627,185	324,957	4,647,193	324,987	4,627,301	J24,987	4,627,181								
BLDGIS	Ł		2.14	100	3020	6591.5	*	325,063	1,617,100	A21,013	4,617,194	32 1,990	5,627,391	321,595	4,627,381	325,012	4,627,381	325,012	4,627,380	325,624	4,617,360	325,074	4,627,500
BT BOILS	3		306	15	200 8 .:	6589.7	-1	321,935	4,627,171	326,933	1,627,191	321,993	4,627,181	324,993	4,627,274								
BEDG80	2	1	y.LF.	8	20083	63869		321,945	4,627,231	324,945	4,627,249	324,970	4,627,289.	324,970	4,627,231								
BLDGN	E	1	9.14	30	2008.4	6587.8	4	325,056	4,627,144	375,035	4,637,765	325,127	4,627,229	375,168	4,637,768	i	[$\overline{}$
BLD621	Ł	1	214	30	200%	6588,1	4	325,307	4,627,272	325,107	4,627,317	325,174	4,627,317.	525,174 -	4,627,276	<u> </u>	· · · · · · · · · · · · · · · · · · ·						
B1.DX623	ı,	1	9.14	14	X039,	6588.1	4	325,161	4,627,330	385,166	4,623,0814	025,176	4,624,981;	325,176	4,627,330								
BTTM)34	{	1_{	9.14	90	2059.1	6588.4	1	DB,213	1,627,471	325,213	1,627,189	321,279	1,027,169	327,270	L627,474								
TEL DOSS	L ∄	1	3.66	12	20060.0	1088.0	•	325,307	4,627,496	323,397	\$,627,106	321,032	4,617,105	325,332	4,627,496								
BLDG26	L		3.66	12	2007.5	6587.6	7	325,276	4,627,335	325,196	4,617,341	325,100	4,627,341	325 KO	4,627,335				l				Ĺ
INT DATE: 1	L		JŁ.40	163	2000.0	6595.1	-	324,965	4,627,145	334,965	4,627,155	334 976	4,677,155	324,978	4,627,345		1 1						
BLDGUS	1		2.10	30	7007	65R7.7	4	325,034	4,637,314	325,091	4,627,730	325,687	4,627,239	025,087	4,627,216								
ELEVTR	1	1 1	20 32	129	2008.0	6587,8	4	125,368	4,627,786	325,369	4,627,791	325,332	4,627,001	025,372	4,624,786								
FOAM	1		JO ON	39	8009.1	6590.4	ŧ	324,522	1,627,289	321,521	4,627,299	321,332	1,627,290	321,531	4,627,283								
SAFEÏY	1	1	10.00	03	2009.4	6092.0		321,630	1,627,300	321,661	1,627,300	311,661	1,627,277	324,630	4,627,277								
PCCU689	1		21:31	ᄁ	200K.9	6390.9	3	325,004	4,627,36t	325,004	4,627,364	325,013	4,627,364	325,013	4,627,366	325,004	4,627,166	325,034	4,627,169	3.34,987	4,627,760	374,987	4,627,161

Suga Ferrior septial Control(ing. L.P., October 2011 Site Riv Wyantog Refining Company Clark Oil Uprinstrution Project Studing Analysis

Table A-2
Sinclair Wyoming Refining Company
Location and Parameters of Circular Structures

Tank Name	Base 10	fevation	UTM Co	ordinates	Tank	Hight	Tunk D	iameter
	(m)	(n)	East (m)	North (m)	(nı)	(ft)	(nz)	(ft)
TK500	2011.46	6599.28	324719.85	4627633.11	3.05	10,01	34.79	114.14
TK513	2011.37	6598.98	324822.64	4627640.58	12,20	40,03	34.77	114.06
TK312	2010.99	6597.74	324895.14	4627627.75	12,20	40,03	18,44	60.50
TK406	2010.91	6597.47	324717.77	4627560.73	14.30	46.92	37.21	122.09
TK.505	2010.37	6595.70	324984.53	4627635,32	9.14	29.99	34.42	112.93
TK401	2009.88	6594.09	324981.03	4627521.91	9.14	29.99	34.83	114.28
TK403	2009.24	6591.99	325082.58	4627520,03	12.20	40.03	25.76	84.53
TK311	2010.62	6596.52	324894.10	4627573.45	12.20	40.03	17.85	58.56
TK304	2010.53	6596.23	324653.86	4627483.66	9.10	29.86	24.14	79.21
TK668	2009.79	6593.80	324892.92	4627445.01	17.20	56.43	20.79	68.22
TK502	2009.63	6593.27	324979.32	4627473.95	9.14	29.99	34.82	114.25
TK541	2009.38	6592.45	325007.05	4627450,10	10.90	35.76	20.81	68.27
TK652	2009.13	6591.63	325036.25	4627430.58	12.20	40.03	9.13	29.95
TK503	2008.69	6590.19	325142.04	4627469.04	9.10	29.86	34.80	114.18
TK512	2008.66	6590.09	325085.39	4627384.15	12.75	41.83	35.26	115.68
TK511	2008.34	6589.04		4627312.37	12.50	41.01	35.36	116.02
TK205	2008.76	6590.42	325029.77	4627350.49	9.10	29.86	15.09	49.50
TK4	2008.67	6590.12	325029.81	4627333.61	3.00	9.84	9.06	29.72
TK120	2008.60	6589.90	325029.81	4627321,63	9.75	31.99	7.81	25.62
TK672	2008.13	6588.35	325323.70	4627532.07	11.50	37.73	11.65	38.23
TK671	2008.07	6588.16	325345.12	4627536,35	16.50	54.13	16.51	54.16
TK676	2008.01	6587.96	325369.65	4627553.09	13.00	42.65	12.14	39.83
TK675	2007.96	6587.80	325369.26	4627530.90	13.00	42.65	12.62	41.42
TK674	2008.19	6588.55	325345,12	4627601.36	19.81	64.99	20.06	65.82
TK499	2008.48	6589.50	325282,43	4627625.88	12.19	39.99	37.87	124.25
TK40	2008.59	6589.86	324811.55	4627236,33	9.40	30.84	5.29	17.37
583VT	2008.34	6589.04	324888.35	4627222,68	27.40	89.90	4.86	15.94
BLDG27	2008.22	6588.65	324950.09	4627225,15	15.20	49.87	5.90	19.34
BLDG28	2008.19	6588.55	324943.16	4627217.29	15.20	49.87	5.55	18.21
TK114	2008.10	6588.25	325017.13	4627233.67	9.10	29.86	9.16	30.06
TK113	2008.07	6588.16	325028,17	4627233.67	9.10	29.86	9.20	30.17
BLDG51	2009.29	6592.16	324895.27	4627364.64	12.20	40.03	16.04	52.61
SWS	2008.30	6588.91	325325,13	4627658.19	30.48	100.00	2.25	7.38
CLARI	2007.70	6586.94	325442,54	4627775.02	12.20	40.03	17.99	59.02
CLAR2	2007.64	6586.75	325457.45	4627758.58	12.20	40.03	19.46	63.83
1000	2007.59	6586.58	325474,92	4627737.68	30.10	98.75	12.03	39.45
COKDR1	2007.95	6587.76	325379,59	4627784.21	36.27	119.00	8.34	27.38
COKEDR2	2007.93	6587.70	325388.44	4627784.24	36.27	119.00	8.34	27.38
COKLERAC	2007.98	6587.86	325375.77	4627769.72	25.91	85.01	4.66	15.30
CONT3	2008.01	6587.96	325388.40	4627659.62	30.48	100.00	2.41	7.89
CONT4	2008.11	6588.29	325362.94	4627716.21	30.48	100.00	2,41	7.89

APPENDIX B SIGNIFICANT IMPACT ANALYSIS MODEL INPUTS

The following attachments are included in this appendix in the following order:

- Table B-1: SfA NO₂ Emitting Sources
- Table B-2: SIA SO₂ Emitting Sources
- Table B-3; SIA PM₁₀ Emitting Sources
- Table B-4: SIA PM_{2,5} Emitting Sources
- Table B-5: SIA -- CO Emitting Sources

7:50; B. 1 56A - NO, Farilling Sources PASM Source Locations, Parameters, and Emissing Robert

S-rance \$19	Scarce Description	X Coced	Y Coud	Eλ	wies	Stuck	(delghe	15mp	natere	Esti 1	ckelly	Stick	Hameler		lanone Stort Jackon Rate	NOT Assaul Emission
		(mates)	(meters)	(Deva)	(ALZICAN)	40.40	(metara)	dig F	deg K	400.6	(m/s)	1				Rate
SECTIONS	ffyddianachar]lesterfff	314,817	4,621,473	6594.8	2010:1	150.0	33.5	PS000	7511	291			(matem)	(lute)	(6,0	(127)
Stigiu	#162 TG RU(Sep 86c)	325001	4,627,129	6955.8	30,00	1000	30.5	163.6	3450		9%	53	1.6200	-2.10	-1 0206	-45/18
) fluidati	24.HDS.132.73.23-751(T40)	124,771	4,627,581	6597.7	2011.0	1000		629.0		419	13.39	25 31	0.7630	-1.14	-0.1436	<u> </u>
FICEET	C4 HUS H2 H: A1 ETITED	324,931	4,627,578	1091.5	2010-9	1000	305	6000	590.8	64.7	19.72		0.0110	966	9,8600	0.20
\$14801F.	#31Bode	174,955	4,621,725	40593	2009.4	50.0	152	990	533.2	12.5	12.95 28.56	1.6	1,0973	001	0609)	026
FUCREGEZE	FOI II lingmarter Visit	325.0E1	4,637,365	49929	20019	100.0	305	220.0	5600	52.6	16 03	5.0	1.5240	190	67268	7.58
MAPAPLH	Maphiba Spiller Herrer	324 591	4 627 131	6901 6	Anatt	1200	366	4010	417.6	30.2	617	7.2 161	2.1900	-3t.60	-3:9925	-566,00
NI LANGE	728 #1 EMS Ficaret	021/835	4,627,360	6578.5	2060 1	200	20.5	1370.0	1016.5	24.0	731	40	12800	6.28 -1.35	-0.7913 0186	-37 <u>73</u> 3
TRET FF[]	185 LEF Measo	221371	1,627,299	6500.0	20086	5100	115	675.0	690.1	21.9	668	3.0	09100	-150	-03971	30.79
11RFF	761 #2 Refeater Beda	324.837	4,627,710	6391.4	2009.1	1900	457	8500	4414	282	738	5.0	1.5300	0.00	0.6004	0.00
YZRLE	781 #3 Referent Heater		4,617,110	669 6	2009.1	\$13.0	40.5	940.0	7716	19.4	896	- 5n	5 5202	0.00	0.0000	0.03
AURITE	781 63 Referent Healey	324,824	1,627,310	6591 5	2065.1	67,0	192	8080.0	635.4	96	291	40	E /2/03	0.00	0.0000	0.03
STABIL	185 Stabilion That a		4,627,310	6501 3	10090	1350	16.2	063.0	635.9	8.7	265	40	127/0	0(0)	0.0000	0.60
FREWERF	583 Vicana Heida (RAT/rit	3210-85	1,027,233	6580.3	2008.4	1320	13.3	1100	643.2	31.6	13.46	46	1 22 003	-8-53	-FJJ988	36.80
382HF101	State High Reday, F101	111,551	4,922,128	6591.7	2009.2	120.0	366	1090 0	RL9 2	350	4.56	1.0	1.2200	0.00	0.0000	4002
082915703	392Tho-Florin [Icrim, VID3		4527 129	6591.0	20092	120.0	36.6	1500 0	1996.5	130	195	50	13200	0.60	0.0000	004
3826110924	\$82 Cook Theren, F6(0)A	124,847	4,627,328	6921.6	2007	1200	35.6	930.0	772.0	195	504	50	1580	0.00	0,0000	-001
987F[[0VII]	SSECTION TRANSPRESSOR	321,530	4,627,318	6391.6	2001.E	1200	166	lusuu	\$33.2	11.1	339	5-0	15200	069	Claud	
SPRIVITION	582 Yeorno Hedar, F104	J21306	4,627,311	6095.9	2009.2	1200	W W	1700	685.2	61.4	19.64	1.0	0.9800	000	066640	0.02
AZHEDSFERR	◆2 €2DXS JSeafer	121,911	4,647,350	5099.1	2009.L	135.0	412	1000	432.0	17.6	321	10	1,2201	-500	-0.0048	-2172
43HEX55HT2R	#3 Elean Service	324,765	4,637,131	699) j	20000.0	760	193	820.0	7EN 9	12.3	3.33	1.0	1.2200	120	-0 2772	-447
-615cHOTT	AB High Present Parkley		1,627,233	69900	20'66	105/3	120	500.0	533.2	425	1296	- 60 - 60	1580	-10.70	-1.1492	—15 6 6
经数别大用	59 Hijà Possore Bolke	321,779	4,627,233	65900	2008.6	1050	120	300.0	533.2	42.5	\$2.95	50	1000	-10:30	-11502	-46 06
LOS BET AK	Light Oal booking Red Was	323,552	8,027,384	6593.9	2000 8	320	10.7	379.0	065.9	103 -	3.£\$	6.0	1 8900	-161	-0.1259	-0.50
HCH1/FD	Dydrocrosser Heider H1862	314,781	4,607,486	6596.5	2020.3	2200	366	\$00 a	4316	395	930	3.4	1,0000	-E.40	-0.2764	-600
IK:H4	Dydorecky kety 115	324,792	4,617,415	6595.7	અહા	24LD	43.0	6300	605.4	16.5	3169	12 3	E 2102	-2.00	-0.2520	9.71
49E1202EX	Hydrogen Mart Hover \$5-301	324,800	4,627,511	65950	체하	KOO	305	580.0	533.1	697	21 24	6%	2000	0.02	0.6025	-0 OE
ecus	Hydronador Thoras 225	324,637	4,021,473	6504.7	2016 1	1250	46.2	610.0	594.3	22.9	673	41	1.1101	-0.87	0.1172	401
CATORS	C#Mplin Orak Kon Ouk	おもおり	1,627,293	(392)	2016.1	15.0	46	6950	6165	90.0	3.03	12	0.3500	-0.71	-0.05007	-1.31
\$\$3VE	SRX Vocanen Steeler - New ULEs	124,585	4,671,355	65600.3	XX4.4	1220	37.1	770 a	693.3	مراز	LE:46	8.0	1.2892	1.93	02412	6,11
COMPRETER	Cokertikeer	5,25,401	4,627,791	6991,9	2007.9	175.0	53.3	6150	597.0	11.6	10.53	68	Z 0900 1	159	0.6045	31,02
CONFERENC	Color Flax	125,638	4,627,697	653HQ	2006.5	1750 i	53.3	1833.7	1271.0	656	20:00	76	2 92 3	6.69	0.6562	20.78
лът <u>н</u>	Nan Derre 48450 waar ban-Sa gereg	729,221	4,628,463	6543.7	19915	46	1.1	1200	799.3	DL2	39.99	01	0.1000	0.56	93906	2.45
ASSSER	1888 Heider	321291	1,627,568	6595.2	2010 2	_1000	ИΥ	213.9	0183	16.9	3.85	5.6	1.7700	199	04890	6.57
CATOX	New Catton		1/4/393	6098.3	20% L 2	150	46	690.0	6565	10.0	1.05	1.2	0.3600	0.22	00151	U+JI
MLK YU15	Ally Theoretics		4,617,900	6597,1	20070.0	50.0	15.2	782.0	694.2	14	071	Ja	1.09/3	3.60	-0.4536	-IS #1
ALK YELLS	Alky That's Refi		4,617,464	6556.2	2007,9	50.0	15.2	752.0	លារៈ	36	E.60	46	6.4971	0.00	0.0003	0.00
22 K 5655	Alky Basis TR		1,627,540	659t.E	300040	78-[23.9	625.0	783.7	3.5	1.05	_33	£ 6958	-100	0188	-18.99
HORAE.	#10High Pressac Parks		4,021,716	6509.2	2005.4	500	. 152	1500	5198	25.1	EU.19	5.0	1.5280	-29.00	-7.5980	-104.70
LPR	er Prose Bales		9301512	6588.9	2008.6	667.0	30.0	.9000	599.2	6.1	FVS	120 :	3,6666	-16 20	3 1767	-117.20
STICH	598 Rooter 189 904	324,893	4,627,324	K589.0	2006.3	000.0	30.5	900Q	5312	52.5	\$5.99	5,0	E 9200	259	0.3763	H (2
olegen Hegen	\$1 TORE!		4,627,650	6557.9	Neso.	[0.00]	225	627.8	604.2	51.9	15 El	- 10	0.5100	092 :	0.1633	3.59
ALLIERES	CA TOPU	325,100	1,627,721	ಚಾಲ	2003.1	1690	965	627.8	601.2	55.9	15.91	30	0.000	0.67	0.1935	3.59
	#2 Hydrogen Mark Horne 58-102		1,627,507	6963	2010:6	100,0	33.5	400	80.5	69.7	25.21	68	2.0560	160	0.1269	43
TUNKANNAS BEHLUIL	Committee CV P1812 1-20 Paragraphic		1,617,368	65666	2007.6	6.0	18	8610	2343	1900	138.61	0.3	0.1000	066	0.6900	15,99
ILZUKULUK.	All Bedar		4697,270	£250 è	2)(8.9	50.0	152	350.0	4493	33.5	1500	50	15200	5 20	0.6551	32.7%
HOROIG	A12 Ph. Cha		4,627,233	6939.7	2008.5	50.0	15.2	500.0	533.2	23.3	26.91	50	15200	2.20	02771	964
EGEN	A13 Bake		4,617,221	6589.2	2009.4	5040	153	500.0	513.2	34.9	10.65	50.	1 5300	087	0.10%	3.51
USPECH 32	[Spilethorse Emergency Constant (QT015A)		160775	6598.9	2008.9	46	_EA .	275 B	297,0	. 43 ,0-	19.LE	ល	0.1020	000	00000	U.EB
MCOSSSS	Argheit Heren 62		4507241	6588.7	2008.1	120		1000-0	8E0 9	14.7	422	1.0	0.9131	-\$.B\$	-0.23M	-8,76
AWCOM	Bollahous Frang Air Coap		5,617,211	69001	20-8.7	7.0	2E	780.0	658.7	31R0	20101	앙	4.1000	0.00	0.0000	235
-MHC1031	No. or Air Consequence	324,751	1,627,232	6500 t	3968.7	7.0	2.1	760.0	688.7	3280	9977	63	0.46%	0.00	0.0000	0.66

Squar Communication And Continues and Contin

a nidektrologijsjeby (ongreg Grafitiis) to esteriogije)

ি হঠি ট-ই SIA - SO, Entitling Suorces Potal Source Localbons, Parameters, সভা Proission Rester

Source ID	Source Ski teasprine	X Coord V Coord Elevation Stack Rulght					T	rallure	F.O.V	electly :	Status	Ranetur	20, 31;	velmnm	20. 35-35	mom Sbort	S(), Anavil	
SHUTE TO	MIDELE IN TRANSPORT	A CORE			12000	3144	Ber God	· '''''	121012			}	A.IIIALG	Hande			Isakon Baic	Pariwion Rate
[1		•	:	ļ.			ile.			
i i		(melters)	Croelesse	(éeet)	(meters)	theth	(metors)	deg P	ArgH	(00%)	[64.4]	(feet)	(meters)	(lb/br)	(2/3)	(lb/lur)	(6/4)	(TPV)
нсиш	Histocracker Heater H3	324.837	4,627,473	6594 R	20001	£10-0	33.3	\$20.0	1163	29.4	8.96	5.)	1,6300	11.00	0.0030	0.63	0.0000	-3.86
#ETK#TU	#Us2 TG# U #Schibber)	325,031	4,627,228	658# A	J038 I	160-0	36.5	t63.0	315.9	13.9	63.3H	2,9	0.7620	-5.24	-0,6693	-5 24	-0.6602	-33 26
FICH1	A4 HD5 H2 H2224 25HTL06	324,771	1,627,581	6397.7	2013.0	600.0	161	680,0	529,8	647	19.73	3.8	0.9449	DJID	auro	0.01	0,0620	136
HCD:	## JEDS JAX Elevier 25/7F102	134,771	4 627 571	6597.5	20109	600.0	36.5	G30.0	093.4	42.5	12.95	3,6	1,0071	0.00	0.0000	0.00	0.0000	-1748
≠E IUCXL	#11 15 adec	324,85%	4,627,223	6559.3	2033,4	.SD.0	11.2	500.0	333.2	72.1	2199	5.0	£.5240	\$20	0 5792	430	0.5292	38.10
FOREGEN!	FCCO Regentation Veta	321,013	4,627,365	6593.9	20%9	Engli	10.5	550 B	360.9	326	66.03	7.2	2.5900	+12 k5t	-53,6871	-184 SL	-53,4874	-717.72
NARSPLEE	Kaphiha Sphiller Meater	324,501	4,627,331	6592.5	2008.1	\$20.0	16.6	400.0	477.6	20,2	6,57	10	1 1200	0.29	0.0365	0.29	100363	-1.71
TEUDSELEK	ya'i 81 fklp\$ flester	124,811	4,627,350	ASOE 5	2009.1	90.0	27.1	1370.0	1616.5	21.0	7.31	4,6	\$2X0	0.7%	0.0290	0.23	0.0290	1788
7811.EFW	76t LEF Berler	321,971	4,622,899	6593,0	2038,6	1104	33.5	675.0	630.4	21.9	6.68	3.6	0.9140	-0.01	-0.0913	-0.04	-0 0013	1 5B
#RFP	TRE 82 Refigures Heater	324,837	4,627,310	6195.1	209001	150.0	45.7	850 ,0	737.K	24.2	738	.50	1,3200	0.00	0.0000	0.00	0.0000	_>an
42HF0	281 ♦2 Beformer Howen	324 Rt6	4,627,350	659E.6	2009.1	\$33.0	10.5	980.0	711.6	22.4	R95	1,0	1 5260	0.00	0.0000	0.00	0.00000	-1,71
#3REF	786 Ø3 Reformer Liester	921,824	4,627,360	6508.5	20091	63.0	19.2	E06040	\$35.4	9.6	252	1.0	1.2800	0,00	0,00000	0.00	0.0600	-1.11
STARIE.	751 Subiliare Heater	321,516	1,627,310	6596.3	2029.0	\$35.0	48.2	687,0	6357	.87	2.65	1.0	1,2200	(US)	40000	0.04	0,0000	-0.68
MOMARES	581 Vacarem Heater CR&Tlinit	324,635	4,627,233	(089.3	2009.1	\$22.0	37.2	270,0	6833.2	37,6	11.46	10	1 2700	-1,00	-0.1260	1110	-0.1269	-9.38
183365.606	592 Fre-Klash Beater, FEON	934,853	4,627,378	A598.7	2009 2	£20.0	34.6	2030.0	838.7	15.0	4.56	1.0	1 7260	D,AD	0,000	0.60	0.0000	000
1825€FE03	332 Pre-Flash Stealer, Filles	321,810	4,627,328	6592.0	2009.2	p.va.n	36-6	E103-0	866.5	13.0	3.95	1.6	1,3200	0.00	0.0000	 ILUO	0.000	0.00
592EE07A	SRI Crede Heatra, F102A	324,817	4,627,323	6198.8	2009.2	\$20.0	16.6	250.0	777.0	19.5	591	10	1 5300	0.00	0.0000	0.00	100000	aus I
1825220281	582 Cervis Meatra, F802B	324,870	4,627,318	659E.6	2009.1	120.0	34.6	2010:0 220:0	803.2 643.2	Ji.L	3,39 69.68	3.0	0.5100	0.60	0.0000	1,60	0.0000	8.00
1927/19604	582 Varoum Heater, 9100	321,865	4,627,341	659E.9		1		300.0	472.0	12.1	5 21	1.0	1 1 1 2 2 0 0	0.00	uunco	1,00	0.0000	-1.71
eymosmer	AT HOS News	324,613	1,627,320	6593.3	2000LL 2009A	E35.0 78.0	482	320.0	720.9	127	3,71	10	1 2200	0.00	0.0000	11130	00000	1 1 1
13HUSLLER		324,763	4,627,374 4,677,231	6590.0	2038.6	605.0	32.0	500.0	333.2	/*.^ \$25	6296	5,0	1,580	-537.65	-173658	-537 R5	-173653	291.13
ASHPEKIEL VIEITEKIEL	es High Presents Boiler	321,779	1,621,233	63940	2038.6	105.0	32.0	500,0	333.2	425	1296	5.0	1,3200	407.60	-17.308	-137,65	-27.1659	-292.18
LOLDELAR	49 High Pressure Boder Eight Oil Lowling Rock Stace	324,379	1,621,213	6193.9	20000	31.0	16.7	379.0	465.9	101	3 64	60	1 2300	0.00	0.0000	0.00	0.0000	4,00
INCHEDELS	Hedrocracker Heater #86817	324,782	4,627,456	4402.5	20ED 3	620.0	36.6	100.0	471.6	30.5	9.30	3.4	1,0400	0.00	0.0000	0.00	0.0000	-2.15
HT784	Hydrocracker filester H	321,782	4,627,495	6595.7	2010.4	646.D	43-0	6300	605.4	36.4	Et.G9	13	13101	000	0.0000	0.60	0,0000	-381
HIRPETR	Shahiyyan Plant Mader M-602	324,800	1,627,512	6393.9	2080.4	100.0	74.5	500.0	513.2	69.7	21 24	6 t	20003	-6.39	0.8305	639	-0.8800	-28 11
INCOME.	Hydrocyneker Heaten 165	334.857	4,627,413	6594.7	2050.L	133.0	11.2	elau	1913	22.9	658	43	1 1100	N 26	0.0328	0.26	0.0928	17.28
CAPOXI	Catalyde Oridation Unit	321327	4,627,193	6593 1	2081.2	150	46	650.0	620.5	10.0	3.00	12	00000	0.00	0.0640	0,60	0.0000	0.00
193735	5R3 Vaccioni Hessar - New Unit	321,885	1,627,203	6589.3	2058.4	122.0	372	7700	653:2	37.6	61.46	1.0	1.1192	101	0.1503	1.58	ngean.	2.45
COXTRIBUTE	Color Hyana	325,401	4,627,730	6587.7	2007.9	173.0	\$3.5	615.0	507.0	14.5	\$0.53	62	1 0700	3.40	0.4184	3.10	0.1281	5.51
CORRELAR	Color i fire	325,658	4,677,690	6583.0	2006.5	173-0	33.3	1331.7	1273.0	63.6	20.00	7.8	2375)	2.15	0.2981	5.32	0.2961	3.32
IEREER	Frite Docke 404369 water earlifer plants	329,221	1,628,663	65 83.7	1994.5	46	1.4	2800	799.3	L31.2	3959	0.3	0.6000	0.02	0.0075	0.00	0 0025	0.09
DSSILTR	BSI Hawa	324,594	4,627,509	6393.1	20102	800.0	10.5	1133	32R 1	169	5.55	5.6	1.7100	0.44	0.0301	ÜLET	0.0551	1.91
CAYOX	New CatOs	334,327	4,627,393	P593 3	20E1 2	L5.0	4.6	650.0	688.5	10.0	9.05	1.2	0,3600	nan	0.0000	0.00	0.0000	ฉพ
ALKYBI3	Alky Heater B13	325,371	4,677,900	65R 7 .4	2007 R	SDO	12.2	761LO	699.2	Li	0.73	9.6	1.0073	-0,40	-00994	-0.40	-0 6501	-1.75
AI KYBIG	After Heater Bld	321,371	4,627,661	(386.8	2017.7	50.0	35.2	757 N	673.2	3.6	92.1	1.6	1.4011	UDV	ALUMAN .	0.60	0.0000	. 4,00
VTEARE	Alby Menter H1	335,838	4,627,540	6595.1	2069.0	76.6	23.9	843.0	7887	3.5	1,01	1,1	8,0048	-0.43	-0 0542	-0.43	-0.0512	-1.89
ATARATHE.	Ø60 JEigh Presoure Gloiler	321,814	4,627,231	6559.3	2008.4	500	15 2	350.0	119.8	33.4	10.79	3.0	E.5210	-2.90	-0.7838	-2 3D	-0-3R98	-10.00
ITPB:	Lew Pressure Boders	321,731	1,627,249	6589.9	2078.6	E67.0	59.9	5000	333.2	6.1	1.95	12.6	3,6606	-86,69	-10.9314	-86 6/1	-inales	-3R4-03
588CH	531 ficate HTT64	314 898	1,627,223	6829.0	20023	\$00.0	10.5	504.0	533.3	52.5	ES 29	50	1 3200	2 3 9	0.3013	2.39	0.3081	-1.30
ABTERTER	#DYGiU	375,190	4,627,650	6587.9	2068.0	300-0	30.5	617.8	606.2	58.9	t5aL	_3.0	0.9100	12.57	1.5838	12.57	1 5233	33.03
भारताहर	การสถ	315,369	4,627,724	655% }	2008 1	200-0	30.5	617.E	6612	56.9	1581	3.0	0.5100	1257	1,9898	15.57	1.5538	33.03
AZTERZUER	#1 Hydrogov Plant Hoalet IR-102	321,722	1,627,507	(896.3	2000.6	100.0	30,5	500,0	543.2	69.7	.21.24	.68	2,0600	1.07	11.13.13	1307	0.E319	±.?3
CHREMENS	Committee CFP11PaF20 Pamp Finging	325,216	4,627,268	65R6-6	2007.6	6.0	E.8	881.0	7213	390.0	E18.67	0.3	0,0000	0.00	0.00000	0.14	0.0176	0.61
AT EEX JIE.	RET Horier	321,775	4,427,270	6990-9	2068.9	5 <u>0</u> 0	35 2	350.0	119.8	69.2	65,00	5,0	1.5866	3.40	0.6384	345	0.4284	3.50
A TABOLE AS	#12 Hotter	321,836	1,627,233	(J) (EV), Y	2098 5	50,0	15.2	5000	333 2	853	2691	5.0	1,3200	5.20	11.6552	5.20	0,6553	840
MIRRORE	923 Rejler	324.214	4,621,231	6589.2	2008.1	30.0	15.2	500.0	533.2	}	10,65	5,0	E 5200	200	0 2320	2.00	0.2520	8.76
SEGEN	Bodesbouse Emergency Generator (Q1075A)		4,627,255	6596.9	2008.9	4.6	1.1	975.0	1910)	43.0	13.EI	0.3	agnoc	пав	00000	000	0.0000	0.00
ASPRHA2	Asphala bleedes #2	3 <i>D</i> ,60	1,627,211	6568.3	2008,1	43.0	52.8	10000	2109	14.2	132	3.0	0.981	-L.59	-0.5000	-0.20	-0,0252	-0.31 -0.6):
251COM508 [Bolkebowe Emerg Air Comp	324,253	1,527,232	6594.1	2008.7	A.O	2.1	7840	€88,7	33%-0	99.97	03	0.2006	0.00	0.0000	JULEZ	-0. 5 151	400

Supremoved Country, L.F. Owner 2017 Status Byordey Syfting Company Ch. MCC Cycumb Statistics

Table B-2 SBA - SO₃ Pmitting Sources Point Source I costions, Parameters, and Embotion Datas

Sowree L	Seurce Description	X Cross	Y Chard	Elés	Elevation		Stack Height		Tempoziture		Est Valority		Hankter	50, Masintunt		SD ₂ Mark	dents Street	NO ₃ Accord
į		1		!			- 1		- 1		. !			Mounty Emiliation		Tenen Emilwenn Rute		Enilssona Rate
1												į.		Rare		<u> </u>		
		(marcas)	(materia)	(fees)	[auten)	(Steel)	(SCO) (DINENS)		dte K	(000) (000)		(Aret) (mateur)		(IMhi)	(6%)	(67.51)	(60)	(TPY)
SEWCOM		321,757	4,627,202	6590.1	2008.7	7.0	2.1	780.0	688.7	928.0	99.91	0.0	0.0006	0.00	0.00-50	0.64	0.61%	0.01

Sychonics Shiller's split Or As Ngl

Kadar Njumby Pojin y Geograp On 600 (Grand Justin) sit

Filie B-3 BIA - PM₀, Pmilling Storges Point Score I residence, Vaporation, and Emiliates Raice

Shaper (D	Source Description	I s com	YCood	- FF	ale e	P										<u> </u>
	convenientelens	A Codia	T Closed	I ***	alles	XH4X	Helgist	Temps	Malerc	Esid V	chage	Stude	Mameler		Jeward Start	PM _{II} Access
!	į.	!	1	i		Ì	i					ŀ		Term Eu	listin Rete	Production Kate
	1	(melera)	(metics)	D9 (0)	fulferil	0.40	(mulant)	dig 5	degK	UNYO B	0470	(fice)	(micri)	(86%)	1 4-00	64.030
13CL/113	Hudwarenby trever HD	321931		€09kB	2030.1	3300	31.5	15/10	7211					0.00	(579)	(LPY)
*11610	#Mile TO (U (Sortber)	325 663	4,627,276	6595 2	2096.1	300.0	30.5	263.0	145.9	89.1 48.9	8.96 13.48	2.7	0.7620	D-0E	0 (4 Ye) -0 0013	-0.00 -0.05
TRUEBI	24 9829 882 FR. Day 27 88 802	325,375	4 627,931	8900.0	70Ea w	UNLU	303	620.0	5018	64.7	1933		09119	0.00	0.6000	005
"1H:[t	CARRES REPORTS 1507 NO.	326,778	4,627,574	6917.5	20109	100.0	333	410.0	605.4	12.5	1295	3.6	1690	0.00	0.0000	060
#I4TECHE.	0t415a5u	52 6,833	6,027,223	6539.3	20084	50-0	157	9990	3332	72.5	28.93	50	1 52.03	0.13	0.0426	1.45
PECREGEN	FOX U Megenerator Valla	325017	4,607,165	6000.9	2008.9	109.0	30.5	550 fb	560.9	59.6	16.03	7.2	21900	-59.90	-75111	261.50
NAMESTA	Naghtha Splitter Iscover	324,696	1,617,145	659 5	2009.8	1200.0	36.6	400 @	477.6	20-7	617	RU	1.2200	0.03	00018	431
*IED/911TE	781 #5 1103 Hover	324,891	4,627,310	6501.5	2000.5	90.0	27.1	2370.0	1016.5	346	7 II	įΕU	1.7204	0.02	00025	0 (0
THE FELL	7BLEFF Reals	321,951	1/27,290	6590 0	2003.6	1100	19.5	675.0	630.4	21.9	663	30	0.3860	4164)	60000	0:00
FIRFF	74 ▼I Refracer Herou	174,817	4,627,110	659L4	2009.1	1900	497	650.0	YUL	262	7.13	5.0	1,5200	900	P/3000	0.09
103EF	78 42 Kefemon Heefec 781 45 Referror Stretter	121,8 6	4,681,010	6591.6	2008.L	133.0	405.	240.0	3316	80.0	1.95	5.0	1.5200	000	DOMAR	0.60
NEAUL	781 Sublime [lever	324,824	4,637,110	K591 S	.2001 L	61.0	19.2	10900	R55-1	96	792	1.0	1,2201	000	8,9704	0.00
\$33V[[0]]	583 Yeoraa Hean Oldfileir	321,848 321,863	4,627,310	6591 1: 4690 3:	2009 0 2008 4	332.0	372	681.0	635.9	87	265	10	.12700	0.00	0.0000	0.00
382285101	Souther Studies Heater, F104	321,651	1,027,328	6091.7	20001	2200	35.6	7A38 1050 0	683.2 438.7	37.6	E1.46	10	1 2220	016	1010.0	-4.35
382245103	599 Pro-2 hwb Islanter, FSG3	324 640	4,627,328	6991.1	20091	120.0 120.0	356	1100 6	556.5	33.0	455 395	40 5.0	2,5200	000	90000 0,0000	0.00
ASOMEISEC	SSI Condellator, Flora	324 B47	1617112	69H X	20092	120.0	35.6	930.0	7720	196	593	3.0	1 3200	000	0 6600	0.00
5971360239	382 Coalefferer, FIGUR	324,870	1,627,328	6911.6	20003	Page .	36.6	1040.0	833.2	11.5	135	50	1 3200	0.00	0.0000	909
SR2VEELOE	542 Vaccine Ho.A.r., F104	32 8,861	6,027,348	637t.9	2009.1	120.0	366	2000	683.2	64.4	1961	10	09103	Udd	0.0000	500
\$24 @ 3,9111R	NZ RIDS Recon	OUGA	9,61310	6592.4	2009.E	135.0	41.1	2000	4270	17.5	5.26	10	t 2100	070	000.0	6.00
2352JSHTR	+t H+s He≠er	114,265	4007.1711	6905.3	2009.6	720	23.8	820 n	760.0	17 2	3.23	40	1,2100	0.00	0.0000	660
48HNHNIT	#3 Eligh Proserm (Beder	324,770	4,627,179	6560 U	24.96	105.0	32.0	500.0	517.2	42.5	1796 5	5.0	1,5260	-14.EB	-1.7846	4108
MARINUL.	678 fight Provente ThePay	124,719	4,627,233	6500 G	2003.6	[05,0	33 0	500.0	533.2	42.5	1296	50	1580	-L1.6K	1.7266	-6106
LCV RTF AR	Light Of Looking Rad, Flanc	321,532	4,627,314	6599.9	2009.8	190	10.7	379.0	353.9	10.3	3.24	60	1 8900 ;	000	0.0000	0.00
20001517133	Lfly/tecrecker@leater.Hil/ETE	321,987	4,627,466	6595.5	20303	120:0	34 K	\$10,0	111.6	10.5	930	5.4	1,0400	200	Road	0.00
HCM	Elly departed on \$500000 ECA	121 181	4,683,495	6595.7	20010.4	54E.0	490	6900	405.1	MAR.	\$1.09	#	13100	Ø00	OCCO-F	0.00
HINGHIN	Hydrogen Plant Elever EL 101	324,500	4,627,512	69959	20501.5	9000	30.5	500.0	531,1	60.7	기원	68	7.9600	0.00	0.6003	014)
- House CATOXI	Hydronia Jun 18 ester [18	321,857	4,627,473	6321.1	2050 [3150	13 Z	6100	504.3	11.9	658	1)	13100	0:00	6,0000	600
SSIVIT	Catalytic Oni Barica Hart	321,327	4,617,390	69753	2011 1	166	46	100.0	6165	30.0	305	12	0.4910	0.90	0.6000	0.00
CONFRERE	583 Vocesse Heries - Max (164) Color Heries	124,695. 325,47E	4,621,233	63993	2008.4	2120	.37.2	1000	48) 2	17.6	E1.46	4.0	5 1191	0.15	0.0651	0.53
COXEFLAR	Color Have	315,691	4 617 629	6693.7 ·	2007.9	175.0	53.3	6150	597.0	315	1033	6.8	2,0100	0.27	0.0940	1.18
JUK-I-K	John Done 4045D water trensfer propp	329.221	1636.463	65917	20363	175.0	23.7	1831.7	1273-0	656	XIGO	7.8	23723	0.19	00130	11.02
TESTELLER	BST33au		5,027,509	6595.6	20101	1.6 1000	1.4 965	980.0 3153	797 B	16.9	5.15	03	0.8003 E.3300	0.05	0.6068	0.22
CATOX	New Calle		1,623,363	6598.3	2011.2	150	46	650.0	6600	10.0	3.05	56 12	0 3600	<u>009</u>	0.0163 0.000	0.41
ALKYBIS	AllertiererDta	125 176	1301300	6597.1	2007.7	30.0	15 7	758.0	691.2	24	0.73	3.6	1.0073	-049	-06008	0.01
ALK YIBSG	Ally (Sorer Bid	325,374	4,627,464	6585 B	2007.7	XIIO	15.2	752.0	673.2	16	1.10	£.6	1.507E	0.00	00000	000
ALKWEE	Ally Ressa Sil		4,627,530	620171	20010	781	23.9	325.0	7E3.7	3.5	105	1.1	10058	001	40000	-0.26
ABICKOII,	SED High Paragram Roller	021816	4,627,211	6589.2	2003.4	900	1117	3540.0	439.E	35.8	1079	20	15310	0.19	0.0239	
1 iuit	Lorr Pressure Bodies	381331	4,627,219	6559.9	32005	367.0	90.0	990	597.2	6.4	1.95	12 0	3.6996	-948	-1 20/5	4200
SSICH	581 bower Living	334,658	4,637,031	699.0	2009.3	300,0	30.5	5000	599 X	525	E5.99	3.0	1.5200	0.72	0.0337	081
491010	11707 44	325,390	4,627,690	8881.0	20.00	Sate	30.5	627.2	<i>8</i> 41	119	E5 82	3.0	0.9100	0.02	0.0705	0.14
4MG10		315,360	4,617,714	6583 1	2008	New	30.5	627.8	604.2	51.9	LSAL	9,0	49100	0.61	0.0025	0.10
CERTAINSE	62 Hpā ogos Plus Bārzin TT-103	323,722	1,627,500	6096.3	2020-6	100 D	90 S	99.0	335 2	69.1	21.24	68.	1000	0(-)	0.0000	0.00
	Committee (LPERE 120 Prince Engine	105,216	₹621.368	6065.6	2001.6	60	1R	\$110	784.5		118.81	0.3	0.3000	0.03	0.080	0.35
FIEROG.	#El Beter #12 Beter		4977733	66603.9	2068.9	30.0	152	350-0-	110 8	.177	1360	5.00	1.5360	0.27	0.0340	1.18
*17DOKE	613 Raffer		1617311	65937	ARRES	30.0	15.2	300 0	513 2	63.1	76.91	30 \$	E2300	∏.¥E	00527	1.60
PEGI-N	Productions and COTORSAL		4,627,218	6530.9	2034	50.0	15.2	100.0	533.2	34.9	10.65	90	52(67	0.16	0.0232	070
ASPERTIGI	Application of a		1,627,255 1,627,211	6508.9	2004.5	420	t.1 128	975.0 96900	791.0	\$3.0	13.61	-01	0.000		9,9000	000
EAST OWNERS	Probations Entergalit Code		4,627,010	69901	20007	7.0	. 12 H	789-0	990.9	112	4.32	30	0.0004	-00]	4(0)()	4,67
NEWCOM	New Air Compressor		4,627,112	6500	20007	7.0	2.5	789.0	693.J	9380	9997	03	0.1006	40.23	00570	-2.19
	In a see completion	التنامعد	-queriene	119911	21797	ro E	2.8	180.10	P88.1	74KG	A1.11	03	0.0506	0.23	00164	WOL

 $\Delta_{\rm p} a \, \Delta_{\rm p}$ constraints and the $a \, \Delta_{\rm p}$. Constraints

Parks Record Record Constitution For the College Section (1998)

Table B-4 Sife (2M_{RS} Emilying Sources Point Source Location, Parameters, and Emiliates Rules

									_							
Same ID	Suecce Disculption	X Count	Y Could	ER:	alion :	Stack	IBJ ₂ M	Trup	Chaffens	Enits	Macelly	Statical	Luicke		MUNICE STORY	PW ^{CS} VPE43
				ı				Į .		ı				Tehu Eu	háto Rak	Eminion Rais
		(metes)	(metern)	Heeth	(mrkus)	effec#1	(maliga)	dre p'	deg K	des	(m/d)	(for 0	(modern)	(Scho)	(60)	(TPY)
BOSHI:	Hjdroneka Bater IB	321837	1/27/17	6091.8	Dillog :	1000	5) 5	3810	711.3	J94	826	53	1 6200	000	8000	060
JUTOTI)	#### TOTE (Service)	325 GOL	4,627,718	6933.2	2076.1	1004	30.5	1630	3459	43.9	13.35	25	0.7520	-0.01	-0.0013	.005
HCHI	PARLIS HZ Meller ZSHFFOL	324,731	4,627,591	6937.7	2011.0	1000	305	620 0	599.B	64.7	19.72	3.1	0.9149	9.03	80000	440
HCHE	TH SILVS S12 STeather 25/33/16/2	324,771	4,617,574	6591.5	2610.9	100.0	30.5	5340	909.1	125	12 95	36	1,0913	Dist	Direct	0.00
+L1EXXL	#th Body	321,855	1,617,225	60993	2068.1	50.0	152	30010	573.2	321	75 98	50	1500)	031	00016	145
FOCBFORM	FO(1) Regarder Vest	325.013	1,637,365	67919	2000	1020	195	959.0	540.9	12.6	16 03	72	2 1906	41.10	-5 6785	-160.73
MAPSPI,IT	Najdaha Spētian Hadas	124,691	4,637,331	693E S	30001	1204	366	490 0	4776	20.2	6.27	10	1.2200	0.03	0.0035	0.11
#IHEXSHTR	781 83 HDS Hacer	324 831	4 637 350	691E 5	2009.F	900	27.4	1320.0	1016.5	24.0	731	40	1.2200	0.02	6,000.5	0.10
145177714	JEE CEF Heder	321974	4,627,299	6390.0	20016	110.9	33.5	605.0	600.1	21.9	668	3.0	0.9240	10/40	IEIGQE	(14)
≠IRLU	SAL #1 Reference Horses	321,931	1,027,310	6898.1	2000LL	1594	0.7	880.0	4157	262	2.19	5.0	15200	0.00	0000	069
ASREP.	781 #2 Reference Heater	921,916	1,627,380	6602.6	2001	13340	195	910.0	9336	79.4	1,95	50	1586	0:00	0.0000	000
¢ tRFF	PRI 01 Selberter Heater	124,928	4,637,660	699t S	2(0)	610	192	16990	R554	76	292	40	1 2300	669	0:0000	0.00
STABIL	788 Statelina Efector	314,848	4,617,380	6971.3	2009.0	135.0	4L2	685.0	635.9	3.7	265	4.0	12201	0020	0.0000	660
SEVIEW	583 Vacuma Berfer OM Unit	324,565	4,627,231	6569.3	2009.4	1220	17.2	770.0	(812	17.6	11.55	80	12800	490.0	40,00102	4135
101/alise:	59.8 Pag-1 Indicates are, 11801	32 (,95)	1,627,328	6891.7	2000.2	120.4	36.6	1050.0	8367	E5.0	4.96	40	12000	0.040	00000	em .
SALLINE	902 Pec-Flooh Efector, F1004	32 EASO	4,607,108	699) 1	2000.2	1200	14i fi	11000	R#6.5	110	195	50	1,5200	0:09	0.000	900
58-213-00-2A	\$52 Create Florier, F102A	124,647	4,617,328	693E&	2007.2	1200	16.6	250-0	7720	E9.5	5.93	5.0	1.5200	98	0.0000	0.00
582HM02H	582 Cet.2e Heath, \$103B	314,870	4,617,32E	6591t.6	2000.1	E2006	366	\$853.0	831.1	E1.1	3.39	5.0	15200	660	0.0000	9.60
SBZYSEIOA	582 Vactoria Healer, FSD4	324,665	\$,627,34E	6591.9	2009.2	120.0	36.6	770.0	6912	66.6	19:61	1.0	0.9160	0,00	Ution	0.60
WHIDWHIR	*214D814c≠cr	328,813	1,621,310	669E.4	20xxXII	235,0	112	940	+>> 0	12.1	2.91	+0	13300	0.00	0.0000	
Altanogallo	#NTDS78:55r	35 K 366	4,007,171	6693 3 :	3669.6	760	78 A	PZOO	7100	23.3	171	10	1,7200	0.00	0.0000	000
GSEIPTICKE.	63 Fligh Prowac Bulla	124,770	4,617,211	6590-0	2008.6	क्षंडव	42 A	500-0	593.1	425	E2.96	50	1,5200	-24.18	-1.7606	-62.66
#9NPBCHE	10 High Pressue Porte		4,027,233	6590.0	2003.6	90206	320	500.0	533.2	12.5	1295	5.0	1.5200	-61.18	-1.7666	6268
LORRELAH	Eight Officering Back Hare	324,531	4,027,314	6593.9	2069.8	35.0	FOLT:	319.0	103.9	90.3	7.81	6.0	1.0900	0.03	0.600	\$50
TOC 146 DAZ	Hydrocreckowáde#enEH/612	321,312	6,627,186	6395.5	20M) 2	1200	16.6	9900	1116	30.5	<u>9 XI</u>	b.t	1,0000	0.00	0,000	. 600
(X:111	[[[sdm;qredqq]] creqfff	3517,955	1887,195	6506.7	20 0 0.8	41430	4340	6900	605.4	35,4	1) (0	.+1	13100	0.00	0.0000	600
HILLIGITE	Etydrogen Plant There at \$1-101	124,900	1833,811	F593 4	2010-4	800.0	50.5	5000	5911	60.7	21 24	62	20000	000	0.0000	0.00
SICHS	Hydronacko Hesse MS	324,857	4,627,473	6594.7	2010.1	\$35.0	41 2	0.000	594.3	22.9	6.58	ŧ	13100	0.00	0.0000	0.00
CATONI	Catalytic Obaddica Usa	324,327	1001703	6598.3	2011.2	15.0	4.6	650.0	6162	90.0	3,55	3.2	03600	0.00	0.0000	800
Market	NOT Vocaron Electer - New Out	321,385	1,627,250	68893	XXX.5	3270	372	9A00	683.5	316	£],{6	-10	1 3 500 P	011	OOFEL	0 61
CORPRINE	Celar Birter	798/40E	1281,140	6587.7	9001 9	53.50	56.6	KI-S O	597 B		\$Ö 53	6\$	20700	0.51	00340	
COXEST AR	ColorFlac	325,698	1637693	KSRE IL	and a	1750	511	BRELT,	1277-0	65-6	20.00	7.2	25723	0.19	0.0239	051
IDFFR.	Mai Bone 40450 with tear Surgaria	529,728	4,628,461	6540.7	E994.5	16	1.4	930.0	T99.8	D12	39.50	03	0.1500	0.05	0.0053	6.22
HSUHSK	DSI Hede	124,484	4,627,509	6395.1	2010.2	1000	30.5 4.6	111.3	3183	16.9 10-0	5.15	3.6	\$37(00) 43(94)	069	0.0000	0.13 0.00
CAJOX	New Code	121,127	1,627,193	05993	2018 2	0.4L 2046		6600 1680	6013	2.6	0.77	E).	2 6003	4003	-0.0038	on
ALK VRIG	AMy [kn/m/t] 5 AMy There 2016		1,607,400	6587.4 6556.6	8897.8 2007.7	50.0	<u>15.7</u>	1516	673.2	3.6	1.16	46	E.4021	0.00	0.0000	9.00
ALK 1755	Alla Hear Hi	325,639	4,627,464 4,627,540	6551.1	2002.0	78.4	23.9	B25.0	713.7	3.5	L03	33	1.0038	0.04	0.0000	0.68
SDSEXUEL	#10 (hgh Steers et lieuter		4,627,211	£559.2	2003.4	30.0	E52	150.0	119.8	33.4	10.79	3.3	1 3Z19	0.04	0.0000	0.25
LPB	Low Pressure Stealers	324,331	4,627,219	6063.9	20/8.6	167.0	30.9	5000	313.2	6.6	1.95	170	3,6935	-9.98	-1 2021	-12 (0
991/16	Stress traces	J215/9	4,627,325	6583.0	N9(00.3	100.0	70.5	990	5112	515	1590	50	6 5200	018	00217	082
ATTOTAL	AS TOTU	125,100	4627691	6987.9	20036	100 0	305	4278	6012	51.9	1521	30	0.9100	N.M	0.0025	0.10
ATOM)	24 TOTU	125 360	4,627,714	£388)	2068 E	100-0	305	627.8	604.2	56.9	15.81	3.0	0.9100	0.02	0.0025	0.10
62H2H1K	12 H) though 175.1 Herber H-1032	321712	4,617,507	6096.3	2010.6	TOTE	303	5000	513 2	69.3	25 28	68	7.050/3	000	00000	U (a)
CORMINS	Comming CLP (10.4 87) Period Capital	325,216	1,627,868	6086.6	2007.6	6.0	1.8	EF10	7/183	990.0	E 9 01	03	0.8669	060	96[0]	0.35
ěl sigone	#L Beikr	325,271	1627,770	59939	2003	50.0	15.7	1590	4198	301	1560	50	2 5100	027	00140	1.12
41 715×153 'A	AIDE A	121826	4,627,231	59997	200	50-6	151	500.0	537.2	R9 3	2691	50	1.5100	0.41	00Si7	130
\$13B06E.	0131503a	324314	4,617,2E1	6989 2	2008.4	50.0	152	3010	533.2	319	10.65	3.00	1,5200	0.26	0.0202	U.70
DEXGEN .	Bededzouse Econgetory Geometry (Q1025A)	314,714	4,627,253	6090.9	2008.9	4.6	1.4	93534	791.0	15.0	13.01	03	0.1093	CEU	District	0.00
ASHIHYZ :	Astrillis/cost	325,041	1,627,245	60663	2,65,1	120	12.8	Budd	980 A	112	(1)	30	0.2211	-001	-000001	409
FMCCOMF908	Beilepherre France Air Comp	924,768	4,627,212	8990	2058.7	7.0	21	7616	653.7	9260	99,97	ăi i	0.1005	-0.73	-00120	-0.18
				69901	2008.7				658.7	328.0	93.97		0.1005	0.63	0.0164	0.03

System and County, t.A.

Andready on the Policy Congress Conf. OSC, to Landing Sugar

Talle B-S Sta - Cr) Yndffleg Modgen Point Source Location, Parameters, and Engleson Rains

Searce 10	Sound Description	X Cour4	Y Coord	Elek	4de5	SIME	12ctobs	Тешр	nalene.	Exity	elocity	Sh(X)	ารเมาเช		Magazide
				Ę.						ı		!		Marie en E	adiable Bale
		(crafteed)	(metre):	4fma)	(metro)	(feet)	(metara)	dr_F	deg K	pi/s) :	(m/s)	- (feeti)	(melera)	(illaha)	6/0
LICORES	Efyddioraetho Hodor FID)/1917	1,637,433	6601±	70b0 s	3000	115	ജവര	T#11	294	896	53	3 6200	0.00	00000
THOUS	\$160 T0332(Sentito)	352001	1617.221	6538.1	1068.1	P00 0	305	163.0	345.9	439	13.35	23	0.7620	LO9	0.1373
EICTIE	15 HUS H2 He26 25HT 103	324,731	1,627,581	6577.7	20E1.0	300 A	30.5	6200	5993	667	29.72	3.8	0.9619	0.04	0.000
мсна	TA HIDS HIZ HIS Zer 25 LLL 102	374.77L	1027374	6897.3	2010.9	200.0	303	6930	600.1	125	12.95	1.6	150/3	0 (%	06600
STATION.	≠I1⊌लील	721,835	1,627,723	6989.1	20.41	50.0	152	4930	533.2	22.1	0194	50	E 62#0	\$ 04	0 1330
ECCREGEN.	[300]Regerqeter Veri	125.018	4,637,164	66919	16689	icán	105	5900	580-9	52.6	35-03	7.2	2,1900	0.00	0.0000
MAP 584 22	Rightler Schler Heater	334,891	4,617,312	657E 5	1060.5	520 G	366	4030	477.6	20.2	G.L7	4.0	1.2200	0.65	0.8357
SETTION TO BE	781 62 HSDS Heiber	314,831	1,627,310	920F7	2009.2	90.0	27.4	1370 0	1086.5	24.0	731	1.0	12200	031	60126
7BILEHH	741 LEF Herbe	321,971	1,627,299	6599/8	20:56	280.0	37.5	665JE	639.1	219	668	3,0	69(0)	0.09	0.0000
MIRLE	yèl # Briggmag Scotter	221834	4,627,310	6591.4	eide) E	150.0	45,9	6990	2326	74.1	713	50	1.5200	0.00	0,0000
42R(d)	92.1 ⊕2 Reforme Eleater	324,846	4,677,116	669 6	366935	1310	105	9896	7776	39.4	8 95	50	1.5300	0.00	0.0000
41JtrF	781 43 Rulianna Steata	114914	1,617,110	K871 S	2009.2	630	192	1650 0	855.4	9.6	202	4.0	1,2200	0.00	0.0000
STARII.	781 St. Inline Mexts	324,846	4,627,310	6591.3	2009.0	135.0	412	645.0	635.9	9.7	263	1.0	\$ 2200	0.00	Q((1))
283.VHOU	583 Vacuum überler USA Omit	321,865	5,627,233	6189.3	2005.1	12740	37.2	2,0902	685 2	34.6	El.46	10	E >993	-170	40 31 42
242040-101	582 Pechindrilleria, Pilia	721,953	1,021,324	6991.7	3077 L	DMS	766	1650.0	319,7	350	1%	40	77200	0.06	0,0000
经规则的	SOX Pro-Flanch [fortin, F]01	324,810	4,617,122	6591.8	20001	1300	366	11200	806.5	13.9	3.05	5.0	\$.5200	0.60	0.0000
SSALLIONA	991 Cross Haga, FEO2A	324,847	4,627,528	6591.8	20032	120.0	36.6	930.0	7120	E9.5	593	5.0	5,5200	050	6,000
25.1LLO3H	582 Chude Heade, F702B	314,370	4,627,328	6591.6	2009.0	120.0	36.6	1041.0	853.2	13.3	339	5.0	2 5200	10.2%	4,0366
581VH904	582 Vaccom Sheeter, V101	324,565	4,627,331	619ED	2009.2	120.0	36.6	7300	683.2	64.5	89,61	3.6	U-7107	0(0	00000
PHILD SHEEK	#21EX338/fcr	324914	1.694,410	6591.1	20(6),3	135.0	#1.7	1640	407.6	\$7.1	5.2E	46	12000	066	00000
◆SI HANGERN	#HERMINGT	126,766	1417,114	H594 1	20026	28.0	212	\$200	210 9	12.2	3.73	40	£ 2200	0.00	0.0000
AN ITYTONS.	48 Tigh Process Builts	124,770	4,627,233	6590.0	2008.6	105-0	320	5060	530.2	425	E2.96	5.0	17200	0.00	4,000
POTEPROX.	19 High Pressure Borks	324,779	4,621,203	6590.0	2008.6	165.0	320	3000	533.2	12.3	12.96	5.0	15200	41.00	00(4)0
LOCKPLAR	ingsi Gitteeding Rock til tæ	324,532	1,627,311	(593.9	20093	16,0	1007	71911	465.9	103	3.11	60	Extro	0.50	00690
BORDES	Hydrogov for Hover HitAR	328,782	1,627,186	6596.5	2010-5	180	166	490.0	427.6	306	9 1/4	3.4	(010)	010	9,0000
JEGER		45 C 139 %	1,601,195	61919	20104	. 1450.	+12	6100	P95.4	354	22 01	41	£ 3100	000	90000
ANTERNISTA	Elydrogen Phent Electric TT-101	314,600	4,627,512	6595 9	2010.4	1000	30.5	390-0	533.2	69.7	22.24	68	20000	0.00	0.000
13CEL2	Hydroxalter Heder HS	324,857	4,627,473	6394.7	2010.t	135.0	417	610.0	3943	22.9	6.5%	13	DIM	ew-	80,000
CATONI	Calalytic Oxidetion Unit	324,327	4,627,393	(598.3	2011.2	65.0	1.6	650,0	6165	10.0	1,05	12	0.3863	900	8000
387H	587 Vectors Berlin - Sex Util	324,686	4,627,835	6569 1	2998.4 2007.9	125 Q	17.1	2100	6St 2	376	LE 46	46	F 27/91	2.60	0 1276
CUKERZEER	Color Hoter	125/14	4,683,350	47937 7			511	6150	5970	34.5	10.53	68	20100	5,80	0.7368
COMPFLAR	Collet Flore	429,69 5	4,627,691	6553-0	2006.5	1750	59.1	3831.7	1173.0	65.6	20.01	7.8	23713	37.00	4.6619
IDFFIL.	Sola Thear 4045D water bounder pures	329,322	4,622,463	6543.7	1994.5	100.0	10-5	9910	793.8	131.2	39.99	9.6	0.1000 1.7500	200	0.0113
HSIRER	DSI He26	32 6,694	4,627,509	6395.1	2010.3		16	313 3 660 0	3283 6965 :	169	\$.15 3:05	. 12	0.3803	060	00113
CVIOX	Mew CRDs A4+11c/co B85	32 £32) 32 £321	1,627,590	6987.4	20117 20078	75.0 50.0	-15	789.0	693.2	24	0.73	36	10073	-0.70	-00082
ALKYUIS ALKYBIS	AD - 17.0 - D36	325,574	4627,464	6956 B	2007.7	500	E52	752.0	m) 2	3.6	1.10	16	1.4021	0.00	0.0000
ATKYIII	Ally Helia HE	325,138	4,627,540	6591.1	2009.0	78.4	23.3	825.0	783.7	3.5	1.05	3.3	1,0058	11.60	0200
A10808	#10 High Pressue No.3ec	324,814	4,627,211	6559.2	2004.1	50.0	152	350.0	£19.8	35.1	10.33	5.0	1.5210	-1.00	4999
EPH	Low throane Boilers	321,732	1,637,239	6059.9	2446	167.0	5919	900	503.7	6+	195	12-0	16606	000	0,0000
falcet	99E Banker 19T 604	124 503	4637 733	69290	2000	109.9	305	500-0	513.2	53.5	15.99	5.0	1.5303	4.02	0.5065
MICIU	93 20323	125 100	4,627,650	4657.9	20090	100-0	3D S	617.8	6012	5E.9	15.81	3.0	0.9100	3.51	0.4423
ATOTU	W 2010	325,100	4,617,724	6553.3	2009.1	100.0	30.5	G27.B	(012	5E.9	15.83	3.0	09800	3.51	0.1127
62H2HTH	#2 Hydropea Pixal Herier H-102	321,722	1,627,500	60%)	2010 6	1010	703	3000	593.7	89:1	21.21	68	20600	-201	40090
COMMINS	Ormains CLPBD & Atthrop Proins	325,216	1627.308	60954	2626.6	60	11	8180	7241	350.0	EES RJ	0.5	à lòm	0.56	0.0706
es incir	#IEThe-Art	324374	4,637,220	6993.9	70000	570	652	1500	649 R	491	15 00	50	15200	280	0.7368
#HPHITE	811%-Z-r	124 #3K	4,617,231	6939.I	1003.5	900	E52	500-0	533.2	68.3	26.91	5.0	1.5200	5.00	1,1063
JOSEPH CIS.	#LI Stoder	324,814	4,627,241	6559.2	2008.4	39.0	13.2	500.0	5312	31.9	10.65	3.0	15800	1.47	0.1852
BEGGEN	Boderkouse Emergency Generator (O1025A)	324,711	4,627,255	6590.9	20000.9	4.6	L.1	975.0	399.0	1971	15.31	03	0.000	të 7u	4 nens
ASPHH02	Agoritiong #/	373,DFL	1027211	65653	20,91	129	12.0	10340	6 04	[17]	4 10	F0	n akili	-046	-0-0831
	Beilefreise Prierg Air Cemp	321,753	4,637,232	69301	10037	70	2 É	7800	638.7	3120	99.97	0.3	40.109G	-2-20	-0-2772
P5200M548															

Squilletocomstitute Yealift. College 272 Lake Bywny Polacythau og Gudt Of Opening of Frans

APPENDIX C NAAQS/WAAQS CUMULATIVE MODEL INPUTS

The following attachments are included in this appendix in the following order:

- Table C-1: Cumulative Analysis NO₂ Emitting Sources (1-hr Average)
- Table C-2: Cumulative Analysis NO₂ Emitting Sources (Annual Average)
- Table C-3: Cumulative Analysis SO₂ Emitting Sources
- Table C-4: Cumulative Analysis PM_{2,5} Emitting Sources
- Table C-5: Cumulative Analysis CO Emitting Sources

Table C-4 Commissive Analysis - NO, Emilting Seasons (1-br Accense) Point Source Locations, Parameters, and Emission Rates

Sparce 10	Source Perceiption	X Ched	Y Count	Eller	ubida Abida		Reight		espine	Enit V	efocity	Stack	Kannder	MI, Made	sem Honely
														Famisio	un Male
		(melaca)	(makes)	(fca)	(makes)	(feet)	(meters)	d+2₹	deg K	((U))	(m/s)	(fivel)	(nucleus)	(lb:bs)	(69)
HCU 7H3	Hydrocracker (teater 133	321437	4.627.473	6591.2	2086.1	t10 ii	39.5	4506	7413	29.1	8.95	5.3	1 6,6185	2,98	IF 3,57G
MEXCHEL	\$1/92 TG NO (Scrubber)	325,001	4,627,228	6558.2	2008.1	600 B	30 1	163.0	315.9	48.9	(3.38	2.5	0.7620	0,46	0.0510
LICER	# MEDS II2 Theater 25HT 801	324,771	4,627,585	6397.7	7011.00	600.0	30.5	620.0	999.8	667	19,72	3 t	0.7447	03.0	(U.EUKOS
UCE13	# \$ REDS TO HOME 2018 F 802	314,771	4,627,574	6397.5	2060.9	660.0	30.5	430.0	605.4	43.5	1293	3.6	1.0973	0.81	0.8068
₹£4BOH.	#14 Beiler	324,453	1,627,221	6569.3	2600.5	50.0	F5.7	100.0	533 2	72 (21.93	3.0	1.5210	1.50	0.226%
POUREGEN	PCCS1Seguerator Vend	325,013	4,627,365	6520.9	7008.9	EDO B	30.5	360.0	368.9	52.6	66.03	7.2	2.1925	10-50-	34419
NAPSPLEE	Nachtha Splitter Hexter	384,501	4,677,185	6101.5	2009.1	\$20.D	30.6	-HMUE	427.6	20.2	6.17	4.0	£ 2192	1.61	0.1042
YEELDSLIER	282 Vi HDS Heater	324,811	4,627,310	6371.5	2009.1	90.0	27.4	1370.0	1026.5	24.0	7.31	40	£ 2197	L.37	118317
TRITEFIE	78] 1.EF 16gates	314,974	4,627,297	6390.0	2008.6	210.0	33,5	675.0	6304	21.9	6 65	3.0	Q.y.J.t.é	0.86	0.8008
¥ERF2	785 DE Refermer House	321,437	4,627,310	6501.4	2000.1	\$90,0	45.7	\$50.0	727.6	242	7.38	5.0	6.5220	1.62	0.2016
¥2REF	741 02 Reformer Elezier	321#16	4,627,310	6591.6	2009.1	233 B	40.5	940.0	777.6	29.1	8.95	5.0	8.5220	2,60	0 3276
19840	761 på Reformer Mexter	324,874	4,627,310	0391.3	2009.1	63.6	19.2	1080.0	855.4	2.6	2,92	40	E 2192	0.60	0.0003
STABIL	781 Stebiliser Hewer	314,148	4,627,316	6391.3	20000	135.0	41.2	685.0	635.9	R,7	2.65	40	1 2192	0.40	0.0501
182TIP105	582 Tro-Flimb Hexica, Flüt	324,453	4,627,328	6491.7	2069.2	120.0	36.6	1050.0	R39.7	150	4 56	4.0	6,2192	3.20	0.1032
SRZHF103	132 Fee-Hash Heater, F103	321,810	4,627,328	6591.3	2003.2	270 B	366	1800.0	866.3	13.0	2.95	5.0	6.5220	3,80	D,4781
182HJ02A	342 Coude Heater, P182A	321.817	4,627,128	6591 ±	7009.2	520.B	36.6	930.0	7720	19.5	5.93	5,0	6,5220	8,60	1.0536
1821110261	512 Crude Heater, P102D	324,#70	4,627,334	6321 6	2009.1	120.0	4,00	10:00	810.2	EJ. E	3,39	50	I SXED	3.40	DYSET
:92VIII04	SB2 Vocanim Tiester, F104	314,865	4,627,345	6391.9	20092	120.0	36.6	770.0	681,2	64.4	19.64	30	0.9164	9:00	1.1319
+2FIE3SHTR	AZ HOS Reates	321,413	4,627,316	6391.4	2059.1	135.0	412	1001.0	4220	17.5	5.21	40	1.2392	E.00	0.3260
HINZOHEK	43 HIX Stealer	321,766	+ 627,371	6593 3	2000-6	78 D	23.8	320.0	710.9	17.7	0.33	5.0	8,2192	0,60	0-0756
SHPEOIL	All High Pressure Builer	324,770	4,627,983	61/311 0	2003.6	103.0	320	3000	3102	12.5	12.96	5.0	1,5210	33,00	2 4950
YOLIPUOIL	29 High Pressure Boiler	324,779	4,627,293	63700.0	2008.6	EU.S.O	340	500.0	513.2	425	17.96	50	1 5250	23.00	2,8980
I.OF.RFF.AR	Light Oil Leading Book Flare	324,332	4,627,314	63933	2009.8	35.0	H0.7	179.0	465.9	103	3.14	60	1.8289	0.19	0.0239
RCH1/H2	Mydrographia Heiter HEINZ	321,742	4,627,486	6595.5	20E0.3	\$20,0	36,6	400.0	417.6	30.5	9.30	3.1	1.0391	£.30	0.1614
RCH4	Hydrouseker Harder 944	321,392	4,627,495	6505.7	2010-4	E43 0	43.0	630 0	601.4	36.1	11.69	(به .	1,3106	2,00	0.2520
TLEIZELEJE	## Hydrogen Plant Hester	384,800	4,627,512	6325.9	2008.4	100.0	30.5	SCHUF	5332	69.7	21.24	6,8	2,0604	EN.72	2.3087
180115	Hydromacker Hester 835	324,657	4,627,473	(394.7	2000.1	600.0	41.2	620.0	291.3	27.9	6,7%	43	1 3106	137	0.1960
593VII	583 Vacuum Haster - New Unit	314.455	4,627,233	ώ89.3	2008/1	122.0	37.2	770.0	6812	376	16.46	40	1 2 192	1.90	0.2127
COKERNER	College Beater	325,401	4,627,750	6587.7	2007.9	£75,0	59.3	685.0	397.0	34.6	10.53	6.8	2,0096	4.80	0,6043
COREFLAR	Coker Flaie	325,658	4,627,699	6533.0	2006.1	E73.D	533	1431.7	1273.0	65.6	200.00	1.8	2.3713	6,80	D-8565
IOFEH	John Deere 40 ESS violer transfer primp	329,221	4,678,463	6143.7	2994.3	4.6	L.A	98100	799.B	131.2	19.99	03	0,1006	0.56	0.0706
OSKLITR	IAST Lifeator	314,594	4,621,509	6383.5	2010.2	£00.0	30.5	123.3	313.3	169	5.15	36	1.7099	1.30	0.1990
CATOX	New CalOs	314,327	4,627,391	63983	20112	15.0	4,6	650,0	6163	HI 0	3.05	12	0.3397	0.12	0.0251
181CH	SSS Acates HT204	321,398	4,627,220	6569.0	2008.3	660,0	30.5	100.0	593 Z	52.5	11.97	5.04	1.5210	6.99	0.8597
43 (GIU)	43 TGIV	325,320	4,627,650	6137,9	7009 G	EDC),D:	30.5	627.8	6012	519	15.86	3.0	0.9184	G RA	0.1033
ដែលប	fiter.	325,360	4,627,724	61893	2005.1	800.0	30.5	8.153	601.2	51.9	35.84	3,0	0,9164	D 82	0.3033
WHIZILEH	62 22vdrogen Plant Heater 22-103	324,222	4,627,507	63963	2050.6	800.0	30.5	500.0	533,2	69.7	28.74	68	2 0604	2.90	0.3651
41 [80]2.	416 Builer	324,771	1,627,230	63869	2008.9	50.0	£5.2.	55N B	449 8	49.2	11.07	5.04	1.5210	5.20	9,6552
STARKTIE.R	412 Boilet	321326	4,627,233	6589.7	2000.5	SQC	E5 2	109 6	333.2	893	26.91	5.0	1.5230	3.50	0.2772
4139K)IE.	Ø13 Bloter	A24,811	-6,627,216	6539.2	2000,4	59 B	85.2	100.00	534.2	3 L9	10.65	5.0	1.5220	0,87	D-1096
ASPIGER	Asphalt [fester #1	335,036	4,627,244	ω853	2008.1	42.0	814	1600.0	810.9	142	432	3.0	0.9164	1.54	U.24J∓
780FCCB3	780 FCC 85cator 198	314,944	4,627,330	6391.4	2009.1	ELEXIO"	33.5	650.0	6165	135	4.11	30	0.9114	2.30	0.2898
780FCCB32	780 FCC Meater H2	324,981	4,627,308	6390.0	2009.6	\$10.0	33,5	750,0	6720	41 6	1256	21	0.7590	4.46	0.5620
£767_£	Dieser-Ctark TEAS 6	329,828	4,624,655	6703.2	2982 A	35 B	50.7	699.3	653.0	8020	31.10	L7	0.5360	43,00	60450
CG 2	theser-Clark IEAS 6	329,878	4,624,646	6102.9	2952 1	33.0	NU.7	699.5	6t1.0	102.0	35,10	1.7	0,1300	43,00	6 0450
cc3	Dresser Clink TLAS-6	318,428	4,624,037	6902.7	EYB2.0	35.0	10.7	629.5	6110	EDEA	31.10	1.7	0.5300	48.60	6,0180
CO 4	Prosser-Clark TF-A9-6	328,428	4,621,619	6502.6	1982.0	35.0	10.7	629,5	644.0	ED2 D	31.10	1.7	0.5300	63.90	8.6519
co.s	Ebover-Clark TEAS-6	328,326	4,621,622	6502.5	19\$7.0	26,0	7,9	609.5	6440	636.2	4630	1.7	0.5500	10:03	1.3360

Significance on Affilia Sing & P. Order 2008 Street for the street of the S

Table III Comutative Austrias - NO, Rmitting Sportsus (File Austrage) Potot Source Locations, Parameters, and Emission Bules

Source 1D	Scarce Description	X Coord	Y Coon!	F6.	alian.	Stack	Reight	ftiup	erelose	Balli V	elocity:	Sixeh I	hameter		neni Hivaely an Rate
		(meters)	(myters)	(fret)	(metera)	(feet)	[mixters)	deg P	degK	(£6/s)	(R-S)	(feet)	(मासंस्कृ)	MM/hr)	.69
JE IA	W2ite-Sup. 6GT-935	138,R\$7	4,634,594	6301 3	1981.6	I¥.U	33	059.5	614.0	29.0	17.98	\$,0	0.3300	3 97	0.3000
1E TB	₩2614-50p 207-325	328,632	4,624,581	6503.4	1981.6	18.0	5.5	7,669	6440	290	17.93	0.1	0.3100	3.97	0.5000
1E_1C	Weits-Sup Stif-823	344,816	1,621,581	6503.5	1981.7	1歳0	15	6993	6440	39.0	17.94	8.0	(0.5k(w)	191	0.5000
18 113	Wikite-Sug. SGT-825	328,610	4.62 k.561	6503.8	1981.8	1 1. IT	53	4993	644.0	39.0	87.98	8.0	0.3460	45/10	0.5540

Signification of differenting \$19. Contact 2001 Smilet Rijerting Aufterg Company Grade (14th), the Tail Halls (14th

Table C-1 Cannulative Auslysis - NO, Emilding Sources (Awaros Average) Point Source Lucations, Parasotics, and Emilatics Mates

INCURT STITUTUTE TO THE TOTAL TO THE T	Hydrocrocker Heater US #USD FOR US CONDECT) #ESDS ED TEATER STITTEIN #ESDS ED TEATER #ESDS	(meters) 321,637 321,637 324,771 324,771 321,835 321,835 324,895 324,831 321,971 321,847 324,848	(nickes) (627,47) 4,627,281 4,627,581 4,627,581 4,627,273 4,627,365 4,627,333 4,627,330 1,627,299 5,627,310	65913 65913 6165.2 6397.7 6397.3 6589.3 6589.3 6391.3	(auctees) 2010;1 2005;1 2011;0 2010;9 2009;4 2009;1	(feet) #10 0 #10 0 #10 0 #00.0 #00.0	(meters) 33.5 30.5 30.5 30.5	64g F 850.0 163.0 630.0 630.0	45g K 74k3 345.9 199.8 603.4	([65]) 29.4 47.9 64.7	(anti) 1.96 13.33 19.72	53 25 31	3,6285 0.7620 0.9119	Emiratou Rate (31°Y) 7.76 207 3.50
37116110 incsis incsis incsis 4148001. FCCRESCIEN PARPELH 31313058126. 388EEFEE 4138FF 358EFFEE 358EF 358EFF 358EF	#U52 (Cit U (Sember) #### SERDS ID Theory 25 ITE ### ##### SERDS ID Theory 25 ITE ### #################################	321,637 375,601 324,771 324,771 321,835 325,063 324,891 324,891 324,831 321,971 321,837	4,627,473 4,627,284 4,627,584 4,627,571 4,627,223 4,627,365 4,627,310 4,627,310 4,627,310 4,627,310	6591,8 6365,2 4397,7 6597,5 6589,3 6500,9 6301,3	2010,1 2003,1 2011,0 2010,9 2003,4 2003,9	#10 0 #100 #60.0 #60.0 \$10.0	33.5 30.5 30.5 30.5	630,0 630,0	781.9 345.9 199.8	29.4 47.9 64.7	1.96 13.35 19.72	5,3 25	3,6285 0.7620 0.9119	7.76 2.02
37116110 incsis incsis incsis 4148001. FCCRESCIEN PARPELH 31313058126. 388EEFEE 4138FF 358EFFEE 358EF 358EFF 358EF	#U52 (Cit U (Sember) #### SERDS ID Theory 25 ITE ### ##### SERDS ID Theory 25 ITE ### #################################	321,637 375,601 324,771 324,771 321,835 325,063 324,891 324,891 324,831 321,971 321,837	4,627,473 4,627,284 4,627,584 4,627,571 4,627,223 4,627,365 4,627,310 4,627,310 4,627,310 4,627,310	6591,8 6365,2 4397,7 6597,5 6589,3 6500,9 6301,3	2010,1 2003,1 2011,0 2010,9 2003,4 2003,9	#10 0 #100 #60.0 #60.0 \$10.0	33.5 30.5 30.5 30.5	630,0 630,0	781.9 345.9 199.8	29.4 47.9 64.7	1.96 13.35 19.72	5,3 25	3,6285 0.7620 0.9119	2.76
37116110 incsis incsis incsis 4148001. FCCRESCIEN PARPELH 31313058126. 388EEFEE 4138FF 358EFFEE 358EF 358EFF 358EF	#U52 (Cit U (Sember) #### SERDS ID Theory 25 ITE ### ##### SERDS ID Theory 25 ITE ### #################################	375,60k 324,77k 324,77k 321,835 325,063 324,896 324,834 321,971 321,847 324,846	4,627,221 4,627,581 4,627,571 4,627,223 4,627,365 4,627,331 4,627,340 1,627,299	6365.2 4397.7 6397.5 6589.3 6509.9	2005.1 2016.0 2010.9 2009.4 2009.9	100.0 100.0 500.0	30.5 30.5	0,631 0,053	345.9 599,8	47.9 64.7	13 33 19.72	25 31	0.762U 0.9119	202
HC151 HC151 HC151 H14HOUT. FCCRESIEN MAPPIZH H3HFF H3HF H3HFF H3HF H3HFF H3HFF H3HF H	#ESSOS SE2 Trader 25 (TES) #ESSOS SE2 Trader 25 (TES) #ESSOS SE2 Trader 25 (TES) #A4 State PUCU Regenerable Vent Nacham Spätter Hester PSE #E HOS Trader 781 JL EP Hester 781 JL EP Hester 781 JL Reference Hester 782 Page-Fish Hester, FLOS	324,778 324,875 321,855 325,063 324,896 324,836 321,971 321,847 324,846	4627,581 4,627,571 4,627,223 4,627,365 4,627,333 4,627,340 4,627,249	6397.7 6397.5 6389.3 6300.9	2018.0 2010.9 2009.4 2009.9	800.0 800.0 50 0	30.5 30.5	630,0	199,R	647	19.72	<u>,3,1</u>	G.9 lay	
HCYLL 114801. 114801. FCCRESSEN MAPSVAH 11505SLER 118FF 1288F 12	#ESSING HI Hower ASHTON ALL Holder FULCH Regionation Visit Nachtha Sphilite Director 786 OF HIGS Hower 781 IN PARAMETER 781 OF Reference Heater 781 OF Reference Heater 781 OF Reference Heater 781 Schiller Heater 781 Schiller Heater 582 Par-Flack Heater 582 Par-Flack Heater, FLOS	324,776 321,835 325,063 324,896 324,836 321,971 321,847 324,846	4,627,521 4,627,223 4,627,365 4,627,333 4,627,340 4,627,340 4,627,340	6589.3 6589.3 6599.9 6391.3	2010:9 2009:4 2009:9	E00.0 SD 0	10.5							
#14ROIL FCCRESSEN FCCRESSE	#14 States PLUL Representative Vent Regular Sphitter Bester 1961 91 HDS Homer 201 LEPS Bester 1961 91 Reference Dealer 1962 92 Reference Dealer 1963 92 Reference Dealer 1964 92 Reference Hester 201 Stabilizer Hester 502 Pac-Flash Hester, Flot	321,835 325,083 324,898 324,838 321,971 321,837 124,836	4,627,223 4,627,365 4,627,333 4,627,310 1,627,269	6589.3 6500.9 6501.3	2009,4 2009.9	SHO		CITIEN S			12.93	3.6	2.0975	3.68
FCCREGERA MAPPIA H 37319USBEIR 388EEEE 419FF 32REF 32R	FUCU Regenerator Vent Rashin Sphiter Bester P86 98 HDS Homer 781 LEP Basten P81 01 Reference Basten P81 01 Reference Basten P81 02 Reference Heater P81 03 Reference Heater P81 Stabiliter Heater P82 Par-Flash Heater, F101	325,063 324,696 324,836 321,971 321,847 324,846	4,627,365 4,627,331 4,627,310 4,627,269	5500 9 6501 3	J001 9			3000	533.2	125	21.98	0.2	E 53.40	743
MAPSYS.H 9191058110. 9191058110. 9191058110. 9191058110. 9191058110. 9191058110. 9191058110. 9191058110. 9191058110. 9191058110. 9191058110. 9191058110. 9191058110. 9191058110.	Nashum Spätter Hester 786 98 HOS Hower 781 1.659 Heater 781 31 Rodennet Heater 781 32 Rodennet Heater 781 32 Rodennet Heater 781 52 Rodennet Heater 781 52 Rodennet Heater 781 52 Place Heater 582 Place Heater 583 Place Heater 583 Place Heater 583 Place Heater 583 Place Heater 584 Place Heater 585 Place Heater 585 Place Heater 585 Place Heater 586 Place Heater 587 Place Heater 588 Place Heater 588 Place Heater 588 Place Heater	324,898 324,838 324,971 321,847 424,846	4,621,310 4,621,310 1,621,269	6321.3			15.2	550.0	500.9	52.6	16,03	72	2 1983	66 60
STRUSSEIR	766 of tion Honor 781 1-FP Honor 781 1-FP Honor 781 10 Reference Honor 781 01 Reference Honor 781 62 Reference Honor 781 Stabilizer Honor 582 Pro-Fisch Honor, Flot	324,834 324,971 321,847 324,846	1,627,310 1,627,299			EG0.0	36.6	400.0	477.6	20.2	617	40	1 2192	7.10
PRIETEE ATREF	781 LEP Heater 783 II Reference Heater 783 Of Reference Heater 784 IS Reference Heater 781 Stabilier Heater 582 Pro-Flach Heater, F101	321,971 321,837 124,846	627,269	بتوس	2009.1	90.0	27.4	1370,0	1016.5	24.0	7.31		12192	5.82
######################################	783 all Reformet Beatrs 783 of Reformet Beatr 783 el Reformet Hester 781 Stabilier Hester 582 Pac-Fis-h Heater, F101	321,837 324,836		6990.0	200.6	110.0	315	675.0	630.4	21.9	6.68	3.0	0.9114	3,50
2288F 2382F 2382F 2572F307 257	761 02 Reformer Hester 761 63 Reformer Hester 781 Stabilieer Hester 352 Pag-Flach Hester, F100	124,816			2000.0	ISDO	45.7	810.0	727.6	212	7.38	5.0	1,525D	7.01
1382F \$FABIL \$522F30 \$522F30 \$526F30 \$536F30 \$426F02 \$426F02 \$430F3ETR \$430FB03 \$430FB03 \$430FB03 \$430FB03 \$430FB03	784 St Reformet Hester 781 Stabilieer Hester 582 Page Flack Hester, F100		1,627,710	6591.4 6391.6	1000.1	633.0	43.7	910.0	717.6	29.4	175	5.0	E 5210	11.39
SEABL SEREPSOI SEREFOR SEREFOR SERENZE SERENZE SEZVILIO PRINSPETE PRI	781 Stabilier: Heater 382 Pea-Flach Heater, F108		4,627,310	6391.3	2069.1	63.0	19.2	1690.0	855.4	26	272	40	1.2192	020
99787901 99787903 99787903 99787020 502787020 50278704 998059878 998059878 99879010	552 Pro-Fla-h Hegyer, F100			63913	2069.1	135.0	48.2	685,0	6359	3.7	203	10	1.2192	1.75
9976F107 9936202A 59266202D 59276304 9939F156TR 9939F156TR 9939F15014 9939F15014		324,848 324,850	4,627,310	6521.7	2003.2	620.0	364	1030.0	836.7	15.0	4.56	-5.0	£.2192	E4 02
5518202A 5426802D 542V8104 928058FTR 938058FTR 938098018 93808018			1,627,328	6721.2	2002.2	120 0	36.6	1100.0	8665	83.0	3.95	5,0	E SAEN	EG 64
542483040 54249304 3237554TR 3336554TR 33367544TR 343493415 34449344	512 Pro-Hash Heater, MIU	321,610	5,627,328 4,627,328	6121.4	1003.2	620.0	36.6	910.0	772.0	\$9.5	1.91	5.0	t 52F0	37.67
562VIIIO4 PRINSETE PRINS	582 Coude Heater, F202A	324,847		6391.6	2009.1	120.0	36.6	1046.0	838.2	16.5	3.39	3.0	6,5260	14.80
PRINCIPER PRINCIPE PRINCIPE PRINCIPE PRINCIPE	582 Coode Heeter, PEOPR	324,810	4,627,328	6391.9	2069.2	120.0	36,6	770,0	6932	64.4	19.61	3.0	0.9114	3242
AMEDSHER AMEDINA AMEDINA AMEDINA	582 Vector Horter, F104	3 24,861 324,813	4,627,331	6531.4	2009.2	E35 Q	43.2	300.0	4220	17.1	5.21	40	£ 2192	434
ANIANIOT*	AZ HDS States	321,765	4,627,310 4,627,374	6737.3	1003.6	780	23.E	820.0	7109	122	3.73	40	8 2192	263
AMINITY AMINITY	43 HEXS Stealer	124,770	4,627,233	6390 0	1005.6	103.0	32.0	500.0	533.2	433	12.96	50	1 5210	100.71
	13 High Fresnus Builer	324,739	4,627,233	6390.0	2003.6	105.0	32.0	500.0	533.2	42.3	12.96	3.0	1.5220	100.74
	69 High Petesono Boiler		1,027,233	6593.9	2069.6	35.0	10,7	379.0	465.9	10.3	311	60	1,9299	0.83
	Fight Oil Leading Sack Place	323,532	1,627,186	6505.5	2010.7	170,0	36-6	400.0	477.6	203	9.30	3.4	1.0594	1,69
SICEERASS	Rythogoseken Heater HIPHR	321,782 324,783	4,627,495	6795.7	2010.4	12150	10.0	650.0	605.4	76.4	11,09	43	1 3106	3.76
NCH4	Hydrocracket lifeater II1	124,896	4,627,512	6395.9	1010.4	10260	30.5	509.0	533.2	69,7	21 24	6%	20601	Et.99
JEHZH (K	WE Elydrages Plent Bester	314,857	4,627,473	6396.3	1015.1	135.0	-88.2	61000	594 1	229	6.93	83	13106	6.88
HC465	ffydraetacher Bester IIS 583 Vogenm Hester - New Ouit	324,885	1,627,231	6589.3	2008.4	122.0	37.7	770-0	6832	17.6	11.65	4.0	1,3192	8.44
9379	Color Rouse	325,405	4,627,750	6587.7	2000.1	175 0	53.3	635.0	197.0	31.6	10.53	6.4	2,0696	11.02
CONTRACTOR	Coker Flare	325,658	4,627,609	6757.0	2005.5	175.0	333	1815.7	1273.0	65.6	30,00	7,1	2 3723	19.74
COMFETAR JUSTER		329,028	1,626,463	6343.7	1991.5	1.6	1.4	260.0	799.8	138.1	39.99	03	0.6806	2.15
	John Desce 1015D water transfer gamp DSI Heater	324,894	4,627,3149	6399.3	20102	100.0	30.5	113.3	3 ER 3	169	3.85	5.6	1.7059	6.57
CAYOX	Say Cath	321,327	4,021,293	6698.3	2018.2	35.0	4.6	650-0	610.3	10.0	3.05	12	0.3597	Q.53
125 CH	551 heatar HJ (64	324,698	1,627,223	6353.0	2018.4	100 0	303	20040	533.2	52.5	15.99	5,0	1 5220	30.62
23TC271 2	40 NG10	325,390	677.650	6537.9	2003 B	100.0	30.5	627.6	6012	38.9	13,81	30	09114	3.59
##GEU	#1 FGTU	125,360	4,627,724	6513.3	DOUS E	100.0	30.5	627.8	6012	55.9	15.81	3.0	0.9114	235
WEEKR	#2 Thydoggrap Plant Bly afer M-EDZ	324,722	1,021,301	6596.3	2010.6	100.0	705	500-0	1332	49.7	21.21	6.1	2.0601	17.79
CUMMINS	Comming CFP31P-F30 Purp Ergina	325,216	4,627,268	6586.6	2007.6	6.11	1.3	344.0	7243	390.0	118.07	0.3	0.1006	15,99
PERROIL	#L1 Stocker	021,7R	1,627,270	6990,9	2005.0	50-0	13.2	350.0	119.8	19.2	15.00	10	1 5250	72.74
PERBOILS	#12 Soiles	134,724	1,627,233	6359.7	2005 1	200	15.2	500.0	533.2	54.3	26 91	5.0	1 1240	9.61
PEZBLUILA PEZBLUILA	*13 Bailer	334,814	4,627,211	6359.2	2006.1	50.0	15.2	500.0	533.2	349	10.63	5.6	1.5290	0.81
	Solerkonse Eugengeney Octornice (QT023A)	324,714	4,627,253	6390.9	2008.9	4.6	1.4	975 B	797.0	43.0	13.61	03	0.3006	0.18
ASPIIFF41	Asplish Heales Ht	325,036	4,627,741	6548,3	2008.5	42 Q	128	2U00.U	810.9	11.2	4.32	10	0.9134	3-06
ASSESSED TO STATE OF THE STATE	US Generator	324,816	1,627,224	6550.5	2005.5	30.0	y.	500.0	593.2	32.1	9.77	1.5	0.4602	621
740+°CCB3	X80 FCC Heater B3	324,944	4,627,330	6391.4	2009.1	180.0	33.5	650.0	6163	13.5	4.EL	3.0	0.40.0	10.07
MONECUL	780 FCC Rester 893	324,981	4,627,300	6390.0	2008.6	180.0	33,5	750,0	672 0	48.0	1231	25	0.7590	19.53
2MCOMSSt	Beijerhouse Emerg Air Comp	324,751	4,627,238	6590.2	2008.7	7.0	2.5	789 B	699.7	329.0	99.91	0.3		1.37
EMCONNO }	MOINTENANT CAUCH A CAUCH	324,765		0004.2		r.**							COLUMN TO	1 [1/
NEWCOM:	Barbarhouse Espany Air Comp		4,637,244	6550-4	2005.7	7.0	21	990.0	71/20	351.0	207.90	0.3	0.2006	2.60

SyrF-...e-walfanib-g.f.P. Dribbrikili Saltin Flynning Selving Company Graf Selving a strain Project

Table C-4 Contofalice Analysis - AN₄ Emilting Sources (Anteun) Average) Point Source Locations, Parameters, and Emission Rates

Source 319	Source Description	N Coord	V Coord	Elevation.		EEright		trajure	Erit L	Medy	Stark C	hamater	XII ₄ Asnusi Emission Rate
1		(m.ten)	[maleus]	(fast) (mateus		(asticus)	dtg F	deg K	(9/6)	(m/s)	(feet)	(meters)	(TPY)
CC66_1	Dheiser-Clauk TLAS-6	328,828	4,624,655	6563.2 \$982.2	35.0	E0.7	699.5	644.0	107 G	32 10	3.7	0.5300	210 24
CG Z	Dresser Clark 1LAS 6	328,628	4,624,616	6592.9 \$982.1	35.0	E0.7	693.5	644.0	1020	31.10	1.7	0.5300	21021
CG 3	Dresser-Clark TLAS-6	328,828	4,674,617	6932,7 2932,0	75,D	EP7	699.5	644.6	1020	32.10	3.7	0.5000	210.21

Signific Constitution (Constitution) One for COM Smilds Khaning Bajul og Company Cas de Gel Optio Extra France

Yable C.J Complative Analysis - Sily Emilling Sources Point Source Locations, Pacameters, and Emission Rules

				Pount	Source La		racaintteri	P, MOU EAU	MOTUE AL	X.							
Surrec ID	Sparge (Krywigtina	X Coord	V Court	£ler	ation	Stack	Haight	Tempo	वर्गावकर	EiRY	4 foreity	Start I	Standiller	843, 33±16	em Hoeriy		mem Sleceri
l .		1						ı		Į.				Emles	es Kate	term Em	isko Nale
l .		I	l							<u> </u>							
		Emeterat	(em (cen)	(fees)	(meetens)	[éten]	(metern)	deg F	degK	(fb/s)	(m ⁵)	(feet)	(mokes)	(Hybr)	(6/9	(INAG)	(8/9)
растина	Hydromacker Mexer 113	321,837	4,627,173	6591.3	2,0105	110.0	33.5	FSQIF	144.4	29.4	195	53	1.6183	130	0.6658	1.30	0,1638
HIGEU	#b/#2 TOTU (Scrubber)	315,691	4,627,228	6545.2	2004.E	30:00	30.5	361.0	186.9	43.9	£3.38	7.5	0,2670	7.06	0.1594	7.06	0.8590
ENTIKE	ZA HEIS SS2 Heater 20H CHUS	321,771	4,627,581	6597.7	70£1,0	\$60,0	305	630 B	179.8	64.7	19.72	3.8	0.9119	11.50	0.0630	0.50	0,0530
luciss in	44 (1805) 397 H _{ERICA} 25HT101	314,721	4,627,071	6199.5	2060-9	\$0.00	10.8	430.0	6424	47.5	12.95	36	1,0773	o.ee	0.0756	0.60	0.0756
วาสมเทน	€E I Stoilet	321,855	4,627,223	6159 7	2009.4	500	152	200.0	333.2	72.1	21.98	5.0	1.5216	1.20	0,5292	470	0.5292
FCCREGEN	FCCHRiganiaza Vint	325,083	1,627,365	6590.9	2008.9	100.0	30,6	150,0	360.0	52.6	E643	72	2.8933	25.19	93375	26.49	3,3375
NAPSPLAN	Naphtha Splitter Meeter	324,591	4,627,33E	6391.5	2069.E	120.0	36.6	400.0	477.6	202	6.17	4.0	1.2092	1.00	0.6374	1.09	141110
PERCENTA	781 31 MOS Stealer	321,001	4,627,310	6501.5	3,0000	90,0	27,4	13700	10165	240	7.31	4.0	1.2192	11.79	0.6292	0.79	0,000
781E EF22	78t T FF Significa	324,974	1,627,299	619000	2008.6	\$10.0	33.5	675.0	690.4	21,9	6,65	3.0	0-9814	0.56	0.0712	U.56	0:0712
338EF	781 \$1 Hefreuer tieder	521,037	4,627,340	6591.4	3,000,8	45D @	45.7	450.0	727.6	Z4.2	7.33	5.0	1.5216	1.60	0.5760	1,00	G 1160
#79FF	181 AZ Rufgemen Media	324,2t6	1,621,310	6591.6	2,000	\$33.0	40.5	2100	777,6	29.4	493	5.0	1.3210	1.70	0.2632	1.70	0.2342
MREE!	781 #3 Reformer Hester	334 R14	1,627,310	6391.3	2009.1	63.0	141	1020.0	135.4	9.6	2.92	4.0	[,2f92	1) SD	80026	0,50,	0.0650
ŞEARIF.	788 Schilives Heater	321,818	4,627,310	6591.3	2000.0	335.0	46 X	693.0	635.9	87	2.03	4.0	1.2192	0.30	0.0374	030	0,0378
SERRE BOE	SB2 Pre-Elmh Mover, F101	324,833	4,627,328	6591.7	2009.2	12001	16.6	1094.0	636.7	15.0	4 %	4.0	1 2192	0.69	0.0756	0.660	0.0756
SEZHF'EO3	SB2 Pro-Plack Etestes, F103	321,810	4,617,328	6591.4	3000,2	370,0	36-6	10000	860.1	13.0	3.93	5.0	1.5210	0.40	0.0504	0.40	0,0304
SEFEELOPA	582 Crost; Hostys, F102A	324,847	4,627,328	6191.8	2009.2	120.0	16.6	230,0	7720	195	5.93	- S.O	L 5210	1.00	0.1269	100 L	6.1360
582H1011	dar Crede Heater, F402B	324,670	1,677,729	6121 6	2009.6	220 B	36-6	10000.0	833.2	11.1	139	5.0	1.5210	10,40	0,0504	U # D	6.0304
SEZVERZONE	SE2 Vacuum Montal, F104	321,845	1827311	6591.9	2000.2	\$20.0	36,6	270,0	683.2	64.4	19.64	3.0	D.9L14	1.00	0.1209	1.00	0,1360
AZEZDSCULA.	€2 HDS Heater	324,R43	4,627,310	6391.4	2009.6	10,665	111	0000	422.0	17.1	5.21	4.0	12192	0,60	0.0756	0.60	0.0356
23MDSHTR	43 BIDS Heater	321365	4.617.371	6503.3	200036	78,0	23,R	120 B	7109	122	3.73	4.0	1.2192	0.80	0.0504	0.40	0.0114
JOSTESH.	ot Wigh Pressure Boiler	324,710	4,627,233	659406	2008.6	105.0	32.0	560.0	593.2	475	E7 96	5,0	£ 5210	235	0.196t	231	0.1961
÷9FEPISIII.	69 étiah Pressuro Badet	32 1.770	1,627,233	653N,0	JB59,6	40% D	32 0	300.0	333.2	425	22.96	5.0	1.5210	2.35	0.2961	275	6 2361
CICREPART	Hydrogracker Meates HE/M2	324,742	1,621,626	6595.5	2010.3	320.0	36.6	400,0	477,6	305	935	3.4	£.0394	41.90	0.1131	0.90	0.1131
HCH1	ffydrectacker ffreder Hi	324,747	4,677,495	61/25.7	2020.4	241.0	43.0	\$30.0	604.1	56.8	61.00	4.3	1.3206	1,30	0,1634	130	Q.1638
#25972ETR	41 Hydrogus Plant Heterc	321,600	1,627,512	6595.9	2080.4	100,0	10.5	100,0	533 Z	69.7	11.24	6.6	2.0694	iili	0.0836	0.11	0.08%
(DCRES	Bydrocrecker Hower 135	324,637	4,627,473	6396.7	2010.0	635Ut	41.1	5100	5063	2229	691	43	1 \$ED&	1.06	0.1331	auci	0.1132
STEVE	583 Vocuma Healer - New Light	321.615	4,627,233	6589 1	JN68.4	\$72.0	371	2740 B	643.2	37.6	11.46	1.0	t.1892	1.51	0.1205	151	6,1907
COKERITER	Coher Mosher	325,601	4,627,720	6187.7	2007.9	\$75.0	933	615.0	727.0	34,6	FF 112	6,L	2 0696	3.40	0.1261	3.40	4.4261
CORPERAR	Coler à fare	325,659	4,677,692	6193.0	7006.3	275.0	33.3	1232.7	1273.U	65.6	20.00	7.8	2.3713	2.35	0,2967	275	6 2967
MFFR.	John Doyag-4045D water tras-fiz pump	329,721	4,628,463	6543.T	1904.5	. 6	1.4	280,0	799.8	131 2	37.97	D-3	0.1006	0.02	0.0025	0.02	4.0075
BSIRTK	BSCLLeater	374,694	1,627,999	61733.6	2050-2	100.0	30.3	313.3	تقالا	16.9	5.15	5.6	1,7099	0.44	0.0249	044	6.0349
CATOX	Non Dath	\$21.527	1611.393	6506.3	20E1.2	350	46	650 B	6165	10.0	3.03	. 1.2	0.3697	0.60	0.0208	000	6,0003
яки	581 No. 200 17F (DA	324,598	4,627,223	6389.6	20093	30000	20.5	500.0	593.2	575	15,90	5,0	1 5210	5.49	0.6912	3.19	0.6912
AST COTTAL	#UTG4U	325,300	1,627,650	6587.9	7069.0	40.00 A	305	627.8	6062	51.9	13.61	3.0	0.9114	12.57	1,1945	[3:57	£ 5841
HTOTU	64 TGFU	321,300	4,411,721	6382.3	2009.E	\$640.0	30.5	677,8	694.2	517	15 E1	3.0	0.9114	12.57	1.58 bs	1255	6.5155
\$2 H 2H3H	#2 th danger from Herrer \$3-162	324,772	1,627,997	61/163	2020-6	EDO.O	363	500.0	333.2	69.2	21.21	6.8	2,0601	127	0,1606	127	6.1606
PETRON.	¥13 Bolky	321,771	4,627,270	6590.3	2008.9	50,0	\$1,3	190,0	4493	49.2	15.00	3.0	1.5216	5.40	0.1261	3.40	0.4564
PEZBOLLR	# 3 Boiler	924,E26	1,627,213	6189.7	2009.5	SILU	152	50000	593.2	883	१६,०१	1,0	1 3210	5 20	0.6452	520	0.6352
€23BON.	Più Boár	321.8E£	£427,281	6589.7	2069,4	SD G	E5 2	2000	333.2	34.9	EU-65	5.0	13310	2.60	0.2520	2,00	0.7570
A5920146	Appholi Heater 91	325,036	1,617,211	61883	2058.1	12.0	12.6	2005,0	#IA T	14.2	431	30	09114	0.30	0.0252	0.20	0.0252
TADECICIES	740 FCC Meser tut	324,911	4,627,350	6921,4	2009.E	E10.D	33.5	650.0	616.5	113	1.11	3.0	0.9114	0.74	0,0797	0.24	0-0297
780FCC[33	780 FCX2 Hearty FF2	321,951	1617.300	6590.0	2099.6	210.0	37,5	799 ft	672.0	42.0	22.31	23	0.7590	0.45	0.0576	0.46	4:0576
W2P1	Wyoming State Pen	385,945	4,671,839	67127	2046.7	36 B	11.0	125.0	4915	27.⊥	1.26	2.8	0.8595	19,68	1 360 L	10 59	5.364IX
W265	Wydorlag 2Xtle Peo	315916	£625,810	6712.8	2046.E	36.0	26.0	435.0	497.0	27.1	2 26	21	0.8595	11.10	6.0505	41.10	6,0607
WSP1	Wyeming State Pen	385,947	4,623,831	6712.7	2016.6	20.0	6.1	550.0	769,9	60,7	59 %	25	0.7390	45.10	6.9603	11.10	6.0505
FNFCXIMEIN2	Bookshours Lovery Air Comp	324,753	4,627,233	6930.2	7003.7	7,6	21	780.0	615.7	324.0	1666	03	0.8008	0.00	0,0000	013	0-0164
EMCOM578	Beilerhouse Frang Air Comp	321,761	1,627,216	6590.4	2059.7	7.6	2.1	930,0	772.0	3540	107.70	03	0.6006	41.00	0.0003	0.16	0.0202
NEWCYIME	tigileragus Corere Air Comp	324,753	4,627,232	61/201	2003.7	7.6	21	789.0	695.7	328.0	9997	0.3	0.1006	0,00	0,0000	0,14	0-0274
REGEN	Beilerkoure Emergency Deneralis (QE025A)	321,964	£627,255	6520.9	2058.3	16	Ē	973.0	797.0	43.0	13.5t	U.3	0.50(5	0.00	0.000	0.00	0,0000
43G6:N	#5 Greeneton	324 RE1	4,621,214	6389.5	2003.1	311.0	9.1	300.0	591.2	32.1	2.77	1.5	0,4602	0.00	0.0000	U 23	0.1625
COMMENS	Cemmine CEPTEE-F20 Purup Eagline	325,226	1,627,268	6526,6	7007.6	60	E.8	H4.0	7243	390.0	168.47	<u></u>	0.1006	0.00	0,0060	0,14	0,0176
		222,230	.,417,100	J													

Sign Enterocom Counting LP. Butter 2015

మార్లు కొల్లా ఇట్టానికి ఇట్టరున్నాయి. ఈ పలిగిత్తినానామునిప్పుల

1 stde C-1 Constitute Analysis - PM_{es} Emissing Surrecs Point Source Locations, Farameters, and Pmission Points

			1020		callons, f'a	en in inco	, , , , , , , , , , , ,	W100 F F1.111	•						
Source ID	Source Description	X Coord	V Coord	Flan	allos	Stack	महाटुन्।	Times	a:::Ifeena	Enis V	el reine	Sissu	Sinceter	PM ₀ , Mag	lmom.Sbxt
	-									į	-	ì		Ferm Em	luton Rate
	[:							<u> </u>							
		(motern)	(melers)	greek	(meters)	(Sect)	(neters)	Ay F	A T	(60)	(only)	(feet)	(meters)	[Rivita]	(6%)
10(17)11	Hydrocracket Regier (13	324,837	4 627,473	63943	2010.L	\$10.0	333	\$80.U	7113	29.5	996	5.3	1,6185	0,10	0,0176
HYGIN	# L/42 FOTE (Sanchbox)	125,600	4,627,278	6599.1	2008.1	E60 0	303	163.0	345.9	13.9	1338	25	0.7620	9.03	0,000
FICHT	e a siest ale lacrier 25454209	321,776	4,627,581	6907.7	2015.0	\$693,0	14,5	670,0	593,R	647	19,72	.31	D9449	9.01	ULOUSU
HCH3	A4 HOX H2 Heaver ZHEEF 602	314,771	4,627,571	6397.1	2010.9	2020	10.5	6310	605.4	425	12 95	3.6	1,0074	9.04	0.6050
PI-453CIST,	#I-f Boils	324,855	4,627,223	65893	2005.4	50.0	112	300.0	533.2	721	5178	5.0	1.5240	Q31	0,0466
LCCKLGEN	TCCU Rependentor Vent	325,613	4,617,165	6920,9	X(3.9	300,0	10.5	2200	569.9	516	16 00	7.2	2.1915	\$1.83	1/1050
MARSPLH	Naglatia Splanes Healer	321,48E	1,627,331	6391.5	2009.1	220.0	16.6	40-0.0	477.6	20.2	6,67	4,0	1 2192	9.09	0.0169
ATROSETER	78E DE HIDS Healer	314,831	4,627,310	6391.5	2009.1	9000	27/4	197050	8086.5	240	7.01	4.0	1 2192	0,06	0.0023
WILLIAM IN	781 8.FF18reter	324,974	4,637,229	4920 0	2008.6	1100	333	673.0	630.4	21.9	6.03	3.0	0.9188	0.01	0,4050
DINER	7.81 \$1 Meformer Merter	321,837	4,627,380	6591.4	2609.1	350,0	45.7	#5Q0	227,6	742	738	50	1.52E0	0.93	ITG161
JIRFF	781 A2 Mefisioner Measur	321,316	1,627,310	6591.6	2005.1	253.0	10.5	560.0	777.6	29.4	895	5,0	1 5200	¢ 54	0.0176
#12Fg	981 A's Refigemen Marion	134,824	4,627,310	6991.5	2009.1	62.0	19.1	3060.0	833.4	9.6	292	k.u	1.2192	6,04	0,0050
SJABIL	786 Stabiliser bleetee	321,868	4,617,110	6501.3	2003.0	1375,0	48.2	695,0	6359	8.7	265	7.0	1.2192	8.92	0.0025
182HF101	132 Pre-Fissa House, F101	311,851	4,617,328	6191.7	2000.2	2200.0	14.6	3090/0	#13L7	18,0	4 56	+0	1 2192	0.14	0.0176
ONDERFOR	592 Pro-Flora Heerer, F103	324,840	4,627,328	6391.8	2009.2	E26.0	16.6	1100.0	866.5	120	3.95	5.0	1.5280	6,571	0.6059
Skattioza	582 Crosto Efeater, FE02A	334.217	4,627,138	8 RGS	2002.1	\$300	36-6	930 0	772.0	19.5	5.93	1.0	1,5260	0.23	0.0250
382H102B	583 Criste Eterler, F30374	321.876	4,617,328	699L6	2009.1	225.0	16.6	1040.0	833,2	11.1	3 17	\$0	1 52EO	0.07	0.0663
332VH104	582 Vaccage Regus, F801	321,861	4,517,341	6191.9	2009.2	12f.0	10.6	7A10	680.2	68.4	19.66	3,0	0.9184	0 24	0.0302
♦XEDSIJ@	B2 SETS TRANSP	334,241	4,637,310	6531.4	2069.1	\$33.0	412	300.0	4220	17.1	5.21	ĹÜ.	1.2192	0.05	0.9969
ATHEOREM	#9 \$2D\$ Mexter	321,765	4,627,376	6503.3	2009.6	78,0	21,8	\$20,0	সঞ্চ	12.2	3.73	4.0	1 2192	0.03	0.0038
49HPBCHE.	48 Жуһ Рымие Воби	321,774	1,627,233	Ğ Y YUU	2006.6	205.0	37,4	500.0	533.2	42.5	12.06	60	1 5160	0.59	0.00239
49ПРВОВ.	49 Wigh Persona Bellin	324,779	4,617,130	65900	7X8.6	203.0	320	30040	533.2	\$2.5	1236	5.0	1.5220	0.59	0,0277
SICERDIA	Mydeocrecker Heater Heate	321,182	4,627,486	65955	ANJO 3	174-0	366	400-0	477.6	30.5	930	3.4	L0394	0.07	IUX68
HETH4	Thydrocracter Heizer H I	321,782	5,627,195	6595.7	2010.4	241.0	41,0	6900	605,4	36,4	1109	43	1 3106	0.86	0.0139
PERMIT	Al Hydrogen Plant Heare	314,803	4,627,512	6193.9	2010.1	0402	202	3020	513.2	69.3	21.24	6.6	7,0694	@ FG	0.0630
isclés	lig decomber illower His	334,257	4,623,473	KFMT	301G 1	235.0	43.3	610-0	594.3	229	658	13	13166	0.4%	0.0105
SHIVIE	343 Vacoum Ebsaler - Mew Unit	321,885	4,627,233	6589.3	Mig.4	\$22,0	.171	770,0	683.2	37.6	11.46	4.0	1.2192	0.12	100131
COKERHIE	Colleg Momen	325,401	4,627,750	6387.7	2007.9	\$25.0	390	615.0	597.0	34.6	10.53	6,8	3 0636	0.51	0.0340
COMMILIAR	Cobys Flore	375,652	4,637,670	61R3 O	1006.5	E75.0	333	323 L.7	1273.6	63.6	ZUUKU	7.8	23765	65.0	0,0245
MESH	John Deere 3045D water transfer pump	329,721	4,628,463	6543.7	1994 1	46	1.4	429.0	797.B	E31 2	39.99	93	ULEDUG	0.03	400063
BSINTR	115E Mealer	321,891	6,627,509	5395.1	brio.2	0.105	20.5	113.3	348.3	169	5,55	5.6	1.7039	009	0.0117
CATON	Star FMO:	311,337	4,627,373	63983	20116.2	13.0	1.6	656.0	636.5	10.0	3004	1.2	0.3597	0.00	0,0003
586CII	596 Swater El Tá 04	174,893	4,627,773	6559 0	અલ્લ રૂ	6034	30:1	2000	533.2	52.5	13.99	5.0	1.5210	0.43	0.0517
ABTOREU	es sessu	325,391	kazkeso	6597.9	2008.0	101,0	30.5	627,8	604.2	55.9	1381	3.0	0.9164	0.62	0.0428
ARTGEO	44 T4TCF		4,627,724	63823	2006.2	1040	303	651%	601.2	51.9	15.01		્રભામ [0,02	O GOZR .
#213210 (dt.	62 Modrogen 19mi Figure 18-102		4,627,507	65063	2010.6	t00:0	30.5	103.0	533.2	69.7	23.21	6.8	1.0004	0.54	0.0680
COMMENS	Commins C1Pk B-5'20 Pomp Proging	325,216	4,627.268	6586.6	7007.6	6,0	18	8540	7143	390-0	t13 B7	53	0.1006	0.00	จมาหา
₽21 EXTIE.	#11 Batter		4,627,270	63903	2614.9	56.0	15.2	350.0	419.8	49.2	15,00	1,0	15310	0.17	0.0040
#12006Ltx	#12 Builer		4,627,133	65E9.7	2009.5	58.0	852	300.0	533.1	68.3	26.91	5.0	1.5210	0.4L	0,0517
PESISOR.	613 Tailer	334,814	4,627,278	45R9 2	2014°+	99-0	152	500:0	533 2	34.9	10.63	3.0	1,5210	U.66	0.0202
RECESS	Boiletbouse Emergency Generalor (Q1sUSA)	121,711	4,627,258	6590.9	20(0.9	4.6	1.4	975,0	797,0	#3 <u>,</u> 0	1319	Q3	0.1006	0.00	രത്ത
AST951192	Anghali Mosto 42	325,036	4,617,244	6368.3	1009.0	12.0	128	2,000.5	850.9	14.2	4,32	3.0	0.031+	0,01	0,0019
#5Gb8l	45 Gorgentes	1334,831	4,627,124	65R9 5	1018 5	300	9.1	500.0	533.2	32.1	9.71	:3	0.4602	0.91	9,1147
780FEX183	760 FCC Herrer EB	328,911	4,624,050	6592.4	3,000,5	130,0	335	690 <u>,</u> 0	8E6.2	13.5	4.14	3.0	0.9114	0.02	0.0625
SKUFCCHIA	ISO FOC Weater HI	124,9EL	4,627,300	6390.0	2018.6	130.0	23.5	750.0	692.0	48.0	1256	75	9,5590	0.04	0.0020
FMCOM552	Perkahense Emany Air Comp	\$24,733	4,617,134	6390 2	1008.7	7.0	2.6	760.0	688.7	328.0	92.97	4.1	0.1035	0,00	QUIII
ENCOSO70	Beifteharas Emerg Air Comp	J24,761	43677,744	6590,4	101017	70	26	2300	7720	354.9	197.98	63	0.1985	0.61	0.0139
NEWCOM	Botheboase Energ Air Comp	321,753	4,627,232	6390.1	2008.7	2.0	2.8	763,0	688.7	3320	99 97	03	0.1006	0.83	0.0166
TVSP)	Watering State Pan	325,945	4,625,879	67129	2016.0	36.6	61.05	425.0	491.5	27.1	8.76	. 7.8	กุสรอร	2 50	0.7646
14583	Whening State Pun	155,946	4,675,880	6712 R	1046.E	36.0	81.0	435.0	\$97.0	27.1	2.26	2.8	0.6193	300	0,4780
WS#3	Wynning State Fen	365.947	4,625,894	6312.3	2046,0	A3-0	6,8	190,0	560.9	699	1# 56	2.3	0.7590	3.00	03180

Agricultural Construction And a Nati

Байы Жулық Берінд Соқық Сой Рійскій жайдағ

Taids C-4 Cumulative Analysis - PM₂ , Emiliang Sources Puint Source I octations, Paradosters, and Emilythe Hales

Source TD		X ('vord	Y (Youd	Ekvat	ЭNI	Stacic	Religion :	Tempe	ecatare	Estit	elocity	Slank 1)	dameter	PM _{ee} Mark	mam Skyrl
	_													Lange Park	polym Trans
			-												
		(martens)	(meteors)	(freit) {	mule(4)	(feet)	(meleas)	deg F	deg K	(60%)	(m/s)	{feet}	(meters)	(lb/hr)	(6/3)
NEWCOM	New Air Cougnisses	321,330	1,027.535	6090.8	2009.7	7.0	7.2	78-10	653,7	3786	9397	0.3	80010	0.10	0.0366

Superiorised Country Cr. Outle XII ನೀಡದ ಕ್ರೀಡರ್ ಕ್ಷನ್ನೆಗೆರಡ್ಡ ಕೊಬ್ಬರು ರೀ. ಹಳಕ ಕ್ರೀಡರ್ ಮುಡ್ಡರ್ ಗಿನ್ನಡಗ

paine C-A Cometative Analysia - CO Equiting Seasons Polyt Nover - Lecutons, Paramoturs, and Equivês a Ratio

Serapre 210	Source its seription.	X C2014	V Costs	551	i nijesi	Mack	Efetzhe	Тепар	ersdane	EsitV	واندوه	Ernki	Phiness		ram Blaudy Castele
l		(mater)	(united)	(5+1)	(mage)	4500	(metern)	A. F	Ag K	(00)	(66)	(See 4)	(India)	[8.24]	62/0
\$10,0213	Hydrogacket Realia M3	114,837	4,617,173	67958	2030.1	25H4I	195	F50-0	7#3	19.4	8.56	53	1.6143	291	11 3.1/2
\$FIGID	31/92 tG10 (8cm/den)	134,601	4,627,228	6558.2	2005.1	100.0	19.5	165.0	715 9	44.9	19.93	2.5	0.7620	روا	0.2165
nicel lis	EN FIDS FILTS: An ESKE boi	321,771	1,637.543	6597.7	MIG	160-0	50.5	626.0	399.8	66.7	19.72	. 3,1	Untia	1194	0.2154
180133	MERLING HELLINGS AND REPORT	114,731	4,627,574	6597.5	2010.9	9940	30.5	*PO	665A	42.5	12.55	3.6	10973	100	0.8360
Alenon.	414 B.3.z	111,995	1514,771	6550.4	2006.4	50.0	15.2	500.0	533.2	77 L	21.55	5.0	1.6240	:64	0.3530
LCCREGEN	(% T 41 Haggreenter Van)	325,033	4,627,363	65903	700,67	[64161	MS	250.0	560 9	52.6	16.03	7.2	7 (935	1157-5	64 45VB
MAPSPEH	Maphilla Sphine Electer	3713/91	1941,611	KSOFS	2000.1	920.0	366	190.0	427.6	20.2	641	+0	1 2252	1 22	0.2339
нјршко-јавах	SAN AN ENGINE FRANCE	124,831	1,627,350	6591.5	Nutl	90-0	27.4	\$370 O	1086.5	24.0	7.3L	30	1.75%	2 11	0.6693
783LEFH	761 LEF3(er/er	124,974	4,627,259	65940.0	2003.6	\$10,0	13.7	677.0	CHI 6	21:11	444	30	0.9814	5.03	0.1260
PIRFP	781 dt Reforma Mexico	321,337	1,674,430	6549-4	2000.1	550.0	45.7	530.6	717.6	212	738		F 2410	133	0.2169
12855	7.51 #2 (tefrement thanker	124,516	4,627,310	659t.6	2008.1	E39.0	40.5	943Q	177.6	P)A	R.95		t.5210	3.00	Q 378F
HISFF	781 63 Refigues Electer	371221	4,9-21,910	659E5	3009.I	63.0	192	60000	835.E	96	3.00	+0	E 2892	0.90	G.E134
NA ABIII.	188 Stabilizar Strata	124,413	4,627,310	G301-7	North	4150	41.2	655.0	635.9	8.7	265	10	E 22W7	11-49	96904
591F0F101	S82 Fac Hitch/Sector, F101	121,751	4,622,323	6591.7	2009.2	\$20,0	16.6	90590	A38 Y	Jib	4.56	40	F 2E92	6.89	0.5122
590116164	391 Pro-Flink Hora of F103	321,4:0	1,621,328	Abolf 9	8601	E10 Q	36.6	5100.0	835.5	13.0	1.95	90	£ 14 l0	04)	9.0344
5820H102A	SSZ Cronte Herrer, I Destru	124 147	4627,318	6533.4	2009.2	3300	15.6	499-0	7720	19.5	5.93	5.0	E5210	2.51	0.2903
SSERTOTTS	551 Craft House, FROM	1715/0	4,577,108	6591.6	2009.1	\$30.D	36.6	(6)9.0	433 Z	11.L	7.79	5.0	1.5340	6.60	0.0756
182721101	367 Yestern Blaster, F104	124,665	4627.341	6332.9	2007.2	3200	16.6	970-0	6812	64.4	19,64	3.0	0.9831	250	A EYAS
THUNSHER	J21ED51tortec	32124	4 (522 310	699t.4	2009.1	\$35.0	16.2	300.0	970	17.5	5.21	40	£ 2£92	2.60	6.8366
*RD#1268	611MXMLater	324,765	4,027,376	6393.3	25016	22.0	29.8	8394	710.9	12.2	3.79	10	E 2592	B/A0	D(69)
(SHPECE	t d filiah Phesone Pirkin	124,270	4,627,233	6530.0	70056	105.0	320	24-1-10	51t 2	42.5	1156	5.0	£5110	8.24	8,69982
Palsinkasi.	40 High Pressure Bolks	324,719	1,627,273	660410	N:06	105.0	320	900.0	333.2	42.5	12.96	1.0	Englu	331	10191
ECCRITAN	1 ag hg 63g proving Stack Fibre	184.532	4,627,354	6333.3	20008.8	39.0	100.9	Waa.	465.9	10.3	3.14	6.0	£3269	0.59	9,7691
18011EM22 .	Hydroneclus Heres HIAD	321,787	13774496	6595.5	2010 7	520 D	36.6	403.0	177.0	10-7	930	35	1,0998	1 50	0.85/00
350131		124,782	1,627,895	6595.7	2010.1	E11 Û	410	6390	605.4	36.4	18.09	13	1,3966	737	@7Msil
#STATE	FL Hindooga Plant 13N fee	271291	43.27,522	6105.9	2310.4	560.0	30.5	500.0	313.7	69.7	20.74	68	2 0 604	13:70	2.996E
517,132	Hydrographic Fleater US	121,857	1,627,173	6391.7	2010.1	415.0	412	619.3	5943	22.9	6.58	13	£ 3306	F S/F	63363
SSSVH	553 Valuria Herter - Mew Cryl	121,385	4.627.233	6529.3	1,2000	2220	377	770.9	685 I	176	18.46	40	£ 2E92	2.65	0.3176
LYTIKERCIEER	Color Heads	377.891	1.677.770	6184.7	N-02.9	6350	59.3	6E5.0	597.0	21.6	10:11	6.9	218/66	5.80	0.7369
COMERAR	Cober Line	325,450	4,627,699	6533.0	2006.5	\$75.0	59.3	DOL2	133160	65.6	20:60	<u>9ă</u>	23773	37.00	1,6519
JDFFR	Administration of the second o	329.272	1,680,481	65112	F 1991 S	4.6	1.4	959.0	199.8	1317	1999	01	0 MG6	6.59	6,6743
Banar	nvell	124,504	4,627,300	6365.8	2030 1	3(-)()	141-5	121 1	F 318 t	16.0	5.15	5.6	1,7099	5.02	0.7179
CATOX	Neo Ceros	321,127	4.4.27.191	69,31	20112	25.0	4.6	0790	6100	100	tui	11	0.3597	964	9,0113
26(0)	SSI News FIT104	124,568	1,627,223	6589.0	70.093	6410	10.5	9000	533.2	52.5	15.99	30	1 2210	5.78	31(9)
391610	13 1010	121,190	4,627,630	6537.9	2002.0	500.0	30.9	E LES	time	52.0	1541	3.0	0.9814	5:55	9,1174
RETURNS	44 TOTU	171,350	13097.721	65653	2002D	160.0	105	627.3	604.2	56.9	15.83	3.0	UNEI	3 51	G-442B
±2H2HTR	Na Hardongern Plant blenter 18-60b	324,722	4,627,307	6536.3	2010.6	31:00	30.5	3020	618.2	61.7	2E.24	6.8	2,0501	1.76	0.3457
1.10004024	Cormin CEP11E-E20 Page English	323,216	1.574.40	6686.6	X076	60	1.8	844.0	1713	390.0	119.97	0.5	U brein	d 56	0.0766
\$1 LEFOIL	A11 Stoder	124,771	4,627,270	6392.9	20499	1990	15.3	1500	4408	69.2	15.60	30	3 5210	530	DUNK
ASSENCE.R.	112 Bidu	371,276	43-21-291	6554.7	20035	33.0	152	500.6	333 7	65.5	74-9	10	2 5210	8.60	1.1688
4335000	All Bolls	374.831	1,623,731	63892	9 (Yari) 4	90	152	900.0	333.2	343	10.65	1.0	3 57 10	643	D 2854
BEOFIS	Bolalo se Energeory Generics (USIN2 VA)	121/111	4,427,255	6990.9	2003.9	1.6	1.1	377.6	2002	411	13.61	0.3	0.6066	22.70	3,6162
AMARIN	Analog Hear of	323,016	1,677,711	6584.1	2003	42.0	128	5000.0	810.9	117	1 32	937	11-11-11	066	90890
KSGE22	#3 Generals	124,511	4.627.214	6559.5	2001.5	30.0	2.1	799	6392	13.1	9.77	···· \$3·	0.4602	7.45	0.9399
NAFCCB3	749FOCH-stra Bi	371,918	4.574.350	6991.4	2009.1	5100	1 93 1	050.6	610.5	13.5	9.11	10	0.0004	0.91	G.ED35
380FCC112	Well Cit Hearth	124,531	1,627,300	6536.0	201el 6	\$100	111	9500	6720	48.0	11231	23	0.7590	1/9	Q 20E1
66 1	Desse Chik SLAS 6	124,326	4,624,665	63012	8932.2	35.0	10.7	6993	6610	NO II	34.40	1.7	0.5360	6.67	0.8361
	December 11 Al-6	328,828	NG21616	6205 4	8552.2 8567.1	150	10-7	659.5	641ä	802.a	31.10	\$.7	0.1103	661	e tent
. 06.2 02.3	Description to ANA	328/830	4.624,657	65027	19320	35.0	10.3	6993	Actu	MULO	31.10	-15.	0.5300	4.67	0.8101
	Dense-Club RAS 6	325,622	4.024639	6502.6	1532.0	35.0	10.7	699.5	6810	8070	91 80	17	0.1100	190	1.1284
06.4 06.3	Danier Chair of Arisis	J28/838	46246T2	65025	E9820	350	7.7	1009.5	6840	636.2	17350 I	5.7	0.5100	13 73	1/6/9
					1931.6	ELO	1 11	6993	6810	170	Elins	10	0.3160	0.99	0.1217
LE IA	W1265:p.80T-925	T YAKEMAN	4,924,586	1.0007.3	693LB	18.0	>>	0777	E 0410		12.5%	• • • • • • •	3 03/100	4.17	4.114

Say De Administrações (S.D.). Contra POS

Freedom Sprawing (A) sing Company Conductable (A) on an ambour and

APPENDIX D NAAQS/WAAQS CUMULATIVE MODEL RESULTS

The following attachments are included in this appendix in the following order:

- Table D-1: Cumulative Analysis 1-hr NO₂ Results
- Table D-2: Cumulative Analysis Annual NO₂ Results
- Table D-3: Cumulative Analysis 1-hr SO₂ Results
- Table D-4: Cumulative Analysis 3-hr SO₂ Results
- Table D-5: Cumulative Analysis 24-hr SO₂ Results
- Table D-6: Cumulative Analysis -- 24-hr PM_{2.5} Results
- Table D-7: Cumulative Analysis 1-hr CO Results
- Table D-8; Cumulative Analysis 8-hr CO Results
- Figure D-1: Cumulative Analysis 1-hr NO₂ Results
- Figure D-2: Camulative Analysis Annual NO₂ Results
- Figure D-3: Cumulative Analysis 1-hr SO₂ Results
- Figure D-4: Cumulative Analysis 3-hr SO₂ Results
- Figure D-5: Cumulative Analysis 24-hr SO₂ Results
- Figure D-6: Cumulative Analysis 24-hr PM_{2.5} Results
- Figure D-7: Cumulative Analysis 1-hr CO Results
- Figure D-8: Cumulative Analysis 8-hr CO Results

Table D-1 Comulative Analysis - 1-hr NO₄ Results

UTM(E)	UTM (N)	2008 Concentration ¹	2009 Concentration	2010 Concentration	3-yr Average	ARM(0.8 * Average)	ARMIT Background
(m)	(p)	(ug/m³)	(ug/m³)	(arg/m²)	(uy/m²)	(ag/m³)	(ug/m²)
	3625100.00	119.18	545.64	331.76	325.53	160,42	£32.52
325000.00	4626400.00	81,92	81.5t	196.91	120,12	96.09	128.19
324600.00	4627100,00	93.07	127.57	(28,29	116.31	93.65	125,15
327000.00	1626260.00	117.34	127,68	103.74	116.25	93,00	125.10
326900.00	4626200.00	109,45	126.63	101.29	112,46	89.97	122.07
324800,00	4626400,00	73.70	72.56	183,48	109.91	87.93	120,03
324645.40	1627196.10	61.76	128,65	132.95	107.79	86.23	118.33
324674.60	4627195,80	61,15	123.70	133,54	106.23	81.99	117,09
324703,80	4627195.20	69.62	122,02	126.94	106.19	84,95	117.05
324800.00	1626500.00	78.09	70.28	163.52	103,96	83.17	115.27
324500.00	4627000,00	98,06	107.02	104.91	103.33	82.66	114,76
324600,00	4627000.00	94.49	110.41	101.99	103.30	82,64	114.74
324620.20	4627197.40	55.89	128.80	124.54	103,08	82.46	114.56
325092.20	4627184.90	82,67	119.03	106,98	102.89	\$2.32	144.42
324595,00	4627198.30	60.02	125.67	121.81	102.50	82,60	144.10
324700.00	4626400.00	67.66	65.92	170.32	104,30	81.01	113.14
325100.00	4626500,00	75,72	65.78	160,90	100.80	80.61	112,74
325000.00	4626500.00	77.07	70,63	153.57	100.42	80,34	112.44
324723.80	4627194.90	66,87	121.04	112.70	100,20	80. EG	112.26
324700.00	4627100,00	58.17	123.77	117.69	99.88	79.90	112,60
324500.60	4627100.00	65.13	111,03	118.63	98.26	78,61	110.71
324500.00	4626900.00	93,22	101.15	97.87	97,41	77.93	110.03
327100.00	4626300,00	102.25	105.98	81,26	97.16	77.73	109,83
32470X0,00	4626500.00	71.29	61,14	152.91	95.78	76,63	108.73
324547.40	4627200.70	\$9.7S	117.82	107.63	95,07	76.05	108.15
324400.00	4626800,00	90,00	97.54	93,39	93.61	74.91	[07,61
324400,00	4626900.00	92.75	90.20	94.23	92.39	73,91	106.81
324522.20	4627201.40	58,27	112.51	100.82	90.53	72.43	104.53
324400.00	4627000,00	81.93	89.10	99,67	90.23	72.19	104.29
324300.00	4626800.00	83.69	87,54	98.05	89.76	71,81	103.91
324799.60	4627192.60	87,8[85.03	93.72	88,85	71.08	103.18
324400.00	4627100,00	81.60	85.95	96,68	88.08	70.46	162,56
324500,00	4627200.00	58.74	106,(6	99.09	88.00	26,49	102.50
	4626900.00	79.16	87.67	95.19	87,32	69.86	101.96
324300.00			105.40	96,84	86.59	69.27	101,37
324497330	4627202.10	57,52	74.39	96.81	85.89	68.71	160.81
324290,00	4626700.00	86.46	98.85	95.35	84,62	67.70	99.80
324760.00	4627000.00	59.67	1	93,08	82.95	66.36	98,46
324100.00	4626600.00	77,57	78.20	117.50	82.63	66,10	98.20
324890.00	4626600.00	72.45	57,94 62.43		82,32	65.86	97.96
324760.00	4626600.00	76,29		108.24 89,68		65.37	97,27
324461.20	4627202.10	62.97	91.73		81.46 80.38	64,30	96.40
324900,00	4626600.00	71.32	59,40	110.42 83.87	79,61	63.68	95.78
324433.30	4627202.20	67.10	87.81		79.38	63.51	95,61
324900.00	4627100.00	86,07	77.94	74,64		63,29	95.39
	4627100.00	50.18	99.37 59.05	87.78 101.38	79.11 76,64	61.31	93.41
	4626600.00	69.48			76.31	61.05	93,15
	4626900,00	59.63	88.03	81,26 79,12	74.77	59,81	95,13
324405,30	4627202.30	64.51	80,68	~~!	74,73	59.78	91.88
324460.00	4627200.00	65,41	80.23	78.55 83,91	74.60	59.68	91,78
324763.20	4627193,50	47.84	92.06	100.54	74.39	59,51	91.61
325196,00	4626600.00	66.17	56,45	74.08	74,35	59.48	91.58
324960.99	4627000.00	80,47 22.60	63.52	72,66	74.05	59.24	91,34
325282.40	4627182,60	77.69	71.80		73.61	58,88	90.98
325233,40	4627179.90	74.60	72,29	73.93	73,42	58.73	90.83
325280.80	4627176.10	74,80	72.00	73.45			90.83
325117.60	4627184.10	70,18	76.03	71,72	72.64	58.11 57.06	90.06
324890,00	4627000.00	50.60	R5,02	81.73	72.45	57,96 57.81	90.00 89.91
325266.10	4627179.90	71.93	79.42	74.42	72,26		89,65
325158.90	4627182,00	69.63	73.29	72.89	71.94	57.55 56.59	88.69
324700.00	4626700.00	67.57	66,85		68.59	54.88	86.98
329276.30	4627614.00	71,55	65.67	68.56			86.58
325019.50	4627186,50	65.61	70.04	68.68	68.17	\$4.48 \$4.36	
324786.00	1626860.00	64.64	71,34	67.71	67,83	54.26	86.36
324972.20	4627187.20	64,95	71.04	67.33	67.77	54.22	86.32
324929.70	4627188,10	63.40	69.66	68.69	67.25	\$3.80	85,90
325000.00	4626900.00	65.91	61.33	69.58	65.61	52.49	84.59
324836.00	4627191.70	48,01	77.21	69,82	65.01	52.01	84,11
324406,00	4627302.60	73.03	\$7.18	64.75	64.99	\$1,99	84.09
329467.00	1627603.90	72.97	58.34	63.35	64,89	51.91	84.61

 $\label{eq:conditional} Table \, \mathfrak{D}\text{-}1$ Commutative Analysis - 1-ler NO_I Results

UTM(E)	UTM (%)	2008 Concentration	2009 Concentration	2010 Concentration	3-yr Average	ARM(0,8 * Average)	ARM: Background
(m)	(10)	(ug/m³)	(ug/m³)	(og'm²)	(ug/m³)	(ug/m³)	(vg/m³)
324400.00	4627300,00	71.90	56.82	64.57	64.43	53.54	83,64
324800,00	4626700.00	61.59	56,45	73.73	63.92	51.14	83.24
324904.28	1627189.10	59.26	65,88	65.47	63,54	50.83	82.93
324405.40	4627236.89	\$3.26	65.60	71.69	63.52	50.81	82,91
324803,66	4627803.10	68.95	58.15	62.35	63.15	50,52	82.62
324878.80	4627190.20	55,92	70.32	61.79	62,68	50.14	82.24
324900.00	4626700,00	56.96	57.84	72,91	62.57	50.06	82.16
329085,50	4627624.10	62.16	56,64	67.72	62.17	49.74	31.84
325100.00	4626700.00	63,32	53.98	68.12	61,81	49.45	\$1.55
325000.00	4626700,00	61.81	56.42	65,97	61.40	49.12	81.22
329037.80	4627626.60	56.83	61,87	65.09	61.26	49,01	81.11
324800.00	1626900.00	46,12	67.88	69.24	65,08	48.87	80.97
324300.00	4627,000,00	55.66	60.06	66,54	60.75	48.60	86,70
324900,00	4626900.00	54.84	65,22	61.77	60.61	48,49	80.59
325000.00	4626800.00	59,17	60.16	57.38	58,90	47.12	79.22
324800,00	4626800.00	54.30	61.06	59.06	58.14	46,53	78.61
324900.00	4626800.00	55.05	60.43	57.49	57.66	46.13	78.23
329423.40	4629208.80	62A3	47.79	51.18	53,81	43.04	75.14
329511.50	4629200.30	58.78	44.87	49.38	50.99	40,811	72.90
329658.60	4629198.10	55.76	43,70	18.98	49.48	39.58	71.68
329700.00	4629300.00	S6.33	-81.83	48.17	48.77	39.02	71.32
329800.00	4629500,00	58.50	39.61	45,77	47.96	38,37	70.47
329900,00	4629600.00	62.77	38.28	41.92	47.66	38.12	70.22
329900.00	4629700.(X)	60,13	37.18	42.34	46,35	37.24	69.34
330000,00	4629800.00	59.54	38,68	40.80	46.34	37,07	69.17

¹ Eighth Highest Maximum Daity I-br Value.

 $\label{eq:constant_problem} Table D-2 \\ Considering Analysis - Annual NO_2 Results$

	UTM(E)	BTM(N)	Concentration ⁴	ARM(0.75 * Average)	ARAI+Background
Year	(m)	(m)	(ug/m³)	(ug/m³)	(ug/m³)
2608	325158.90	4627182.00	8,29	6.22	11.92
2009	325 (58.90	4627182,00	13.30	9.97	15.67
2010		4627182.00	10.97	8.23	13.93

¹ Maximum Annual Average.

Singe Environmental Consulting, LP October 2011 Sinclair Wyoming Refining Company Crade Oil Optimization Project

Table D-3 Cumulative Analysis - 1-hr SO, Results

UTM(E)	UTMON	2068 Concentration	2009 Concentration ²	2010 Concentration	3-yr Average	3-yr Average + Background
		(ng/m²)	(ug/m ³)	(ug/in ²)	(eg/m²)	(ng/m³)
(a)	(iii)		, , , , , , , , , , , , , , , , , , ,	87.40		198.98
324250.00 321000.00	4630750.00 4630230.00	56,92 53,93	105.16 80.33	93.27	81.16 75.84	96,64
	4629750.00	54.09	63.62	86.17	67.96	88.76
	4631250.00	49.00	76.47	69.63	65.03	85,83
321000.00	4629500.00	58.55	59.09	73.64	63.76	84.56
321250.00	4630506.00	51.76	55.85	79.31	62.30	83.10
	4627195,20	51.08	63.80	64,29	59.72	80.52
	4631000,00	51.66	46.53	77.61	58.641	79.40
	4627195.80	52.17	59.90	62.35	58,14	78.94
	4627100.00	49,69	64.25	58.10	57.35	78.15
		47.66	58.34	62.94	56.32	77.12
324600.00	4627000.00	54.40	57.51	54.89	55.60	76.40
321500.00	46302S0.00	57.67	45.84	60.89	54.80	75,60
324500.00	4627000.00	53.51	53.72	57.00	54.75	75.55
	4626900.00	50.90	56.40	55.27	54.19	74.99
	4627194.90	42.77	56.28	61,31	53.46	74.26
	4627196.40	36.85	61.61	61,90	53.45	74.25
	4626900.00	49.64	54.87	54.66	53,06	73.86
321500.00	4629500.00	48.96	54.83	54.82	52.87	73.67
	4627100.00	47,31	52.22	58.91	52,81	73.61
	4630250.00	53,93	45.64	55.94	51.84	72.64 72.16
	4622000.00	38.23	46.91 61.18	68.95 58.20	51.36 51.28	72.16
324620.20	4627197.40	34.46		56.17	50.97	71.77
	4627000.00 4630000.00	47.59 50.48	49,15 44,91	54.69	50.03	70.83
	4630000.00 4627000.00	47.95	52.56	48.83	49.78	70.58
	4630500.00	54.50	46.48	48,26	49.75	70.55
	4626900.00	49.13	50.15	49,28	49.52	70.32
	4630250.00	52,63	42.98	52.38	49.33	70.13
	4630750.00	51,17	42.53	53.72	49.14	69.94
	4627198.30	35.40	57.52	54.18	49.03	69,83
	4627000.00	39.75	47.93	56.44	48.04	68,84
324300.00	4626800.00	44.34	47,89	51.28	47.84	68.64
324400.00	4627100.00	48.99	40.46	52.25	47.23	68.03
321750.00	4629750.IKD	45.84	47.27	48,60	47.04	67.84
324547.40	4627200.70	33.24	52.76	53,28	46.42	67.22
324763.20	4627193.50	32.25	49.48	57.01	46.24	67.04
10. 2 2	4626900.00	40.60	45.89	51.89	46.12	66.92
	4627100.00	36.54	53.30	48.0B	45.98	66.78
	4627201.40	34.39	48.66	53.34	45.44	66.24
	4630500.00	48.21	41.87	46.18	45.42	(6.22
	4627192.60	37.52	(4,55	52.54	44.87 44.67	65.67 65.47
	4627320.00	43.92	43.93	46.17	44.67 44.40	65.20
1	4626800.00 4623000.00	40.02 42.77	44.76 40.53	48.41 49.52	44.40	65.07
	4627000,00 4627200,00	34.75	46.35	50.91	44.00	64.80
	4526700.00	40,32	44.00	47.49	43,94	64.74
	4626900.00	39,41	43.90	48.39	43.90	64.70
	4627342.60	42.31	43.73	45.32	43.79	64.59
	4630000.00	44,09	44.47	42.74	43.77	64.57
	4626900.00	44.20	43,64	43.12	43.65	64.45
	4627202.10	34.24	45,53	50.41	43.39	64,19
	4627100.00	30.31	19.04	50.51	43.29	64.09
	4627343.50	41.88	{2,9 }	44.66	43.15	63.95
	4627581,00	44.17	39.41	45,23	42.94	63.74
324100.00	4626900.00	40.33	41.61	46.76	42.90	63.70
	4627182,60	43.07	41.32	44,23	42.87	63.67
	4627180.70	42,81	40.45	45.18	42,81	63.61
	4627180.40	42.26	40.66	44.50	42,47	63.27
	4627000.00	38.84	44.02	44.08	42.31	63.11
	4627176.10	42.35	39.59	44.81	42.25	63.05
324836.00	4627191.70	35.97	40.14	50.32	42.14	62,94

Table D-3 Commitative Analysis - I-hr SO₂ Results

(FFM(E)	UTM (N)	2008 Concentration ²	2009 Concentration ¹	2010 Concentration	3-yr Average	3-yr Average + Background
(m)	(65)	(ng/m ³)	(ug/m²)	(ug/ns ¹)	(eg/m²)	(ug/m²)
3249(M.20	4627189.10	34.18	40.42	\$1.60	42,07	62.87
324509.00	4625750.00	48.89	33.52	43.48	41.96	62,76
325233,40	4627179.90	40.95	41.53	42.95	41.81	62,61
325401.90	4627180.20	40.74	41.18	43.42	41.78	62,58
325560.00	4627278.50	40.89	39.93	44.42	41.75	62.55
	4627184.90	36.42	44,64	44.11	41.72	62.52
	4627184.10	38.94	43,56	12.64	41.71	62.51
	4627300.00	40.99	39.41	44.65	41.69	62.49
324100.00	4626760.00	19.36	40.95	44.44	41.58	62.38
325662.10	4627344.30	40.52	40.64	43.13	45.43	62.23
324878.80	4627190.20	35.15	39.68	49.23	44,35	62.15
	4627100.00	30.23	46.53	46.27	41,01	61.81
	4627188.10	31.71	40.35	50.33	40.80	61,60
	4627179.90	39.35	40.84	42.04	40.74	61,54
	4627202.10	33,30	41.60	46.05	40.32	61.12
	4627182.00	37.52	42.83	40.37	40.24	61.04
325200.10	4627179.90	38.06	42,36	39.89	40.10	60.90
327000.00	4622000.00	38.38	30.96	50,68	40.00	60.80
	4626800.00	36.87	38.89	43,47	39.74	60.54
325711.60	4627345.20	39.42	38.76	41.01	39,73	60.48
32/10(0).00	4626900.00	37.78	38.08	43.17	39,68	60.48
324300,00	4627500.00	43.24 39.41	34.95	40.69 40.18	39.63 39.53	60,33
	1626800.00	37.57	39.29	40.18	39.09	59.89
	4627179.90 4627300.00	38,27	36.68	41.22	38.73	59.53
325560.00	4627237.10	39.84	38,16	37.90	38.63	59.43
	4627185.80	33.05	42,15	40.22	38.47	59.27
324100.00	4627000.00	40.67	34.57	40,05	38.43	59.23
	4627202.20	32.96	39.04	42,95	38,31	59.11
	4627346.IN	37.95	37.53	39.40	38,29	59.09
	4625750.00	39.83	33.04	41.49	38.12	58,92
	4627182,10	36.48	37.96	39.32	37.92	58.72
	4627100.00	36.80	37.51	39.26	37.86	58.66
	4626900.00	36.62	36.03	40.63	37.76	58.56
	4627100.00	37.13	36,99	39.05	37.72	58.52
	4627346.90	37.38	36.77	39.03	37.72	58.52
	4627100.00	37.42	36.99	38,37	37.59	58.39
324000.00	4626800.00	36.21	35.61	40,37	37.40	58.20
325560,00	4627195.70	38.36	35.47	37.97	37.27	58.07
324405.30	4627202,30	32.11	36.85	42.27	37.07	57.87
325546.30	4627183,70	35.63	36.86	38.63	37.04	57.84
325200.00	4627100.00	36,80	37.44	36.72	36.99	57.79
	4627200.00	32,47	36.70	41.77	36.98	57.7B
	4627347.70	36.69	35,39	38.12	36.73	57.53
	4626700.00	34.61	35,68	39.73	36.67	57.47
	4627000.00	29.06	39.40	41.45	36.63	57.43
	4625750.00	39.16	32,10	38.61	36.62	57.42
		35.82	35.18	38.53	36,51	57.31
		37.54	34.46	37.51	36,50	57.30
	4627100.00	34.83	32.36	41.44	36,21	57,01
		36,75	33.70	36.82	35.76	56.56
		32,49	35.20	39.57	35.76	56.56 54.40
	4625750.00	38.77	30.88	37.43 37.33	35.69	56.49 56.47
	4627300.00	35.(1	34.27	37.33	35.67 35.65	\$6.47 \$6.45
	4627348.60	35.95	33.73 28,26	42.52	35.44	56.24
	4626200.00 4625500.00	35.54 38.76	31.32	35,88	35.32	56.12
	4627000.00	35.48	32,90	36.74	35.04	55.84
	46271000.00	35.35	32.49	37,24	35.03	55.83
	4626900.00	35.66	31.61	37.81	35.03	55.83
~~ >>VU,UU		34.80	29.19	40.55	34.85	55.65
324900.00	400 231 20K 211 F F					

Pay	UTM(E)	UTM (N)	2008 Concentration	2009 Concentration	2010 Concentration	3-yr Average	3-yr Average + Background
\$2275000 \$427505 \$65.50							
13215000 14627360 00 1 36.13 1 30.13 137.94 1 34.72 1 55.53 138.87 1 34.68 55.68 132500 1462749.40 1 34.20 1 22.88 36.11 34.46 55.56 132500.00 1462749.00 1 34.69 1 22.88 36.11 34.46 55.56 132500.00 1462700.00 1 34.69 1 22.00 1 35.58 1 34.12 55.22 134270.00 1 462700.00 1 34.69 1 22.00 1 34.69 1 22.00 1 34.69 1 22.00 1 34.69 1 22.00 1 34.69 1 22.00 1 34.69 1 22.00 1 34.69 1 22.00 1 34.69 1 22.00 1 34.69 1 22.00 1 34.69 1 22.00 1 34.69 1 22.00 1 34.60 1 34.60 1	<u> </u>			30.81		34.78	
1946800 00 4626900 00 32.65 32.55 33.87 34.68 55.56 3125938 00 4627900.00 4627800.00 44.68 32.00 36.58 34.42 55.52 3127800.00 4627800.00 47.86 32.00 36.58 34.42 55.56 3127800.00 4627800.00 47.86 32.00 36.58 34.42 55.56 3127800.00 4627800.00 4627800.00 33.90 31.73 37.31 34.31 55.11 327700.00 4627800.00 33.90 31.73 37.31 34.31 55.11 327700.00 4627800.00 33.90 31.73 37.31 34.31 55.11 327700.00 4625800.00 33.90 32.79 34.21 34.22 55.06 32.79 34.21 34.22 55.06 32.79 34.21 34.22 55.06 32.79 32.79 34.21 34.22 55.07 32.79 32.79 34.21 34.22 55.07 32.79 32.79 32.79 32.79 34.21 34.22 55.07 32.79 32.79 32.79 34.21 34.22 55.07 32.79 32.79 32.79 32.79 34.21 34.22 55.07 32.79							
132700.00 4627300.00 14.68 132.00 35.58 34.42 55.52 174700.00 162700.00 1 33.90 13.73 37.31 34.31 55.11 174700.00 162700.00 1 33.90 33.91 37.73 37.31 34.31 55.11 174700.00 162700.00 1 33.90 33.91 37.73 37.31 34.31 55.11 174700.00 162700.00 1 33.90 33.91 37.73 37.31 34.31 55.11 174700.00 162700.00 1 32.50 33.90 35.02 32.91 34.22 35.02 174705.50 1627271.70 32.50 33.90 34.79 34.73 34.22 55.02 174705.50 1627271.70 32.50 33.90 34.89 34.81 34.10 34.90 175900.00 1627000.00 1 32.50 33.90 34.89 34.89 34.81 34.10 34.90 175900.00 1627000.00 1 33.60 33.91 34.80 35.94 34.10 54.89 175900.00 1627000.00 1 33.60 33.91 34.80 35.94 34.00 54.89 175900.00 162700.00 1 33.60 33.11 35.24 34.00 54.80 175900.00 162700.00 1 33.49 26.90 41.46 33.95 34.00 54.80 175900.00 162600.00 1 33.49 26.90 41.46 33.95 34.74 175900.00 162600.00 1 33.49 34.00 54.80 35.91 34.90 175900.00 162600.00 1 33.49 34.00 54.80 35.91 34.90 175900.00 162600.00 1 33.49 34.00 54.80 35.91 34.90 175900.00 162600.00 1 33.49 34.90 175900.00 162600.00 1 33.49 34.90 175900.00 162600.00 1 33.90 34.90 175900.00 162700.00 1 33.90 34.90 175900.00 162700.00 1 33.90 34.90 175900.00 162700.00 1 33.90 34.90 175900.00 162700.00 1 33.90 34.90 175900.00 162700.00 1 33.90 175900.00 162700.							
1947 1947	325958.90	4627349.40	34.20	32.88	36.31	34.46	55,26
124900.00 4627000.00 33.90 31.73 37.31 34.31 55.11 324900.00 462500.01 35.92 32.91 34.22 35.02 32250.00 462700.00 35.92 32.91 34.23 34.22 35.02 322500.00 462700.00 35.92 31.89 38.43 34.10 34.93 325000.00 462700.00 35.26 31.88 35.59 34.89 38.43 34.10 34.90 32550.00 462700.00 35.26 31.88 35.59 34.99 34.89 38.43 34.10 34.90 32550.00 462700.00 35.26 31.88 35.59 34.99 34.89 38.43 34.10 34.90 32550.00 462700.00 33.68 33.11 35.24 34.00 35.89 325500.00 462700.00 33.89 34.89 38.31 35.24 34.01 34.81 325500.00 462700.00 33.49 26.59 41.46 33.55 34.00 35.80 324750.00 462600.00 33.49 26.59 41.46 33.55 34.75 325600.00 462600.00 33.49 26.59 41.46 33.55 34.75 325600.00 462600.00 33.49 34.00 34.90 246600.00 462600.00 34.92 27.72 39.88 33.31 33.80 34.69 325600.00 462700.00 33.84 33.73 34.01 33.86 34.67 321600.00 462700.00 33.84 33.73 34.01 33.86 34.67 321500.00 462700.00 33.84 33.73 34.01 33.86 34.67 321500.00 462700.00 35.84 33.73 34.01 33.86 34.67 321500.00 462800.00 32.94 35.50 35.35 33.33 35.66 322500.00 462800.00 33.84 33.73 34.01 33.86 34.66 323500.00 462800.00 33.84 33.73 34.01 33.86 34.66 323500.00 462800.00 33.84 33.73 34.01 33.86 34.67 323500.00 462800.00 33.84 33.73 34.01 33.86 34.67 323500.00 462800.00 33.84 33.73 34.01 33.86 34.67 323500.00 462800.00 33.84 33.73 33.91 33.67 324600.00 462800.00 33.84 33.73 33.91 324600.00 462800.00 33.84 33.73 33.91 324600.00 462800.00 33.84 33.73 33.91 324600.00 462800.00 33.84 33.95 32500.00 462800.00 33.84 33.95 32500.00 462800.00 33.84 33.95 325000.00 462800.00 33.84 33.95 32500.00 462800.00 33	325700.60	4627200.00	34.68	32.00	36.58	34.42	55,22
1924790 00 462600.00 33.91 37.04 42.72 34.26 55.06 32250.00 462700.00 28.99 34.89 38.43 34.10 54.90 32590.00 462700.00 35.26 31.88 35.57 34.89 38.43 34.10 54.90 32590.00 462700.00 35.26 31.88 35.57 34.89 38.43 34.10 54.90 32590.00 462700.00 35.26 31.88 35.57 34.99 38.43 34.10 54.90 35.89 32590.00 462700.00 35.26 31.88 35.57 34.99 35.89 35.89 35.99 36.89 35.99 36.89 35.99 36.89 35.99 36.89 35.99 36.89 36.90 36.80 36.90 36.80 36.90 36.80 36.90 36.80 36.90 36.80 36.90 36.80 36.90 36.80 36.90 36.80 36.90 36.80 36.90 36.90 36.80 36.90 36	324700.00	4626200.00	34.60	26.23			\$5.16
1925/90.00 4627900.00 35.90 35.90 34.89 38.43 34.10 34.20 35.00 35.90 35.90 34.89 38.43 34.10 34.90 35							
124-05.09 4627271.20 32.56 33.39 36.45 34.11 54.93 325000.00 4627000.00 35.26 31.08 35.59 34.89 38.43 34.10 54.99 54.89 325400.00 4627000.00 35.26 31.08 35.59 34.09 54.89 325400.00 4627000.00 35.26 31.08 35.59 34.09 54.89 325400.00 4627000.00 35.28 33.11 35.24 34.00 54.80 325700.00 4626700.00 31.58 30.11 35.24 34.00 54.80 325700.00 4626700.00 31.58 30.11 35.24 34.00 54.80 325700.00 4626700.00 33.49 26.59 41.45 33.55 34.00 54.80 325700.00 4626700.00 33.49 26.59 41.45 33.35 54.75 325600.00 462700.00 33.49 31.50 35.01 33.94 54.74 325600.00 462700.00 33.49 27.72 39.88 33.31 34.69 325600.00 462700.00 34.02 27.72 39.88 33.31 34.67 325600.00 462700.00 34.02 27.72 39.88 33.34 54.67 325600.00 462700.00 36.44 28.94 36.19 33.36 54.66 325900.00 462700.00 36.44 28.94 36.19 33.36 54.66 325900.00 462700.00 36.44 28.94 36.19 33.36 54.66 325900.00 462700.00 36.54 29.69 35.24 33.33 54.63 325600.00 462700.26 36.54 29.69 35.24 33.33 54.63 325600.00 462700.26 36.54 29.69 35.24 33.33 54.63 325600.00 462700.26 36.54 29.69 35.24 33.33 54.63 325600.00 462700.26 36.54 29.69 35.24 33.37 35.46 325600.00 462700.00 36.44 28.94 36.19 37.75 36.57 37.75 36.57 37.77 37.57 36.57 37.77 37.57 36.57 37.77 37.57 36.57 37.77 37.57 37.77 37.57							
\$23-000.00 4627000.00 \$28.99 \$14.89 \$38.43 \$34.10 \$34.90 \$25400.00 \$4627000.00 \$35.26 \$31.08 \$35.94 \$34.09 \$54.89 \$32.900.00 \$4627000.00 \$33.69 \$26.81 \$42.36 \$34.09 \$54.89 \$32.900.00 \$4627000.00 \$33.69 \$33.69 \$33.11 \$35.24 \$34.00 \$54.80 \$32.900.00 \$4627000.00 \$33.69 \$33.13 \$30.13 \$40.28 \$34.00 \$54.80 \$32.990.00 \$4626000.00 \$31.49 \$26.90 \$41.46 \$33.95 \$54.75 \$32.900.00 \$4626000.00 \$33.49 \$26.90 \$41.46 \$33.95 \$54.75 \$32.900.00 \$4627000.00 \$33.40 \$24.74 \$31.68 \$38.13 \$33.89 \$54.69 \$32.900.00 \$4627000.00 \$33.44 \$33.93 \$34.69 \$32.900.00 \$4627000.00 \$33.44 \$33.73 \$34.01 \$33.86 \$34.69 \$32.900.00 \$4627000.00 \$33.44 \$33.73 \$34.01 \$33.86 \$34.69 \$32.900.00 \$4627000.00 \$33.44 \$33.73 \$34.01 \$33.86 \$54.66 \$33.900.00 \$4627000.00 \$33.44 \$28.94 \$36.10 \$33.86 \$54.66 \$33.900.00 \$4627000.00 \$34.44 \$28.94 \$36.10 \$33.86 \$54.66 \$33.900.00 \$4627000.00 \$34.64 \$28.94 \$36.10 \$33.86 \$54.66 \$33.900.00 \$4627000.00 \$34.64 \$28.94 \$33.81 \$34.61 \$34.86 \$34.63 \$32.900.00 \$4627000.00 \$34.64 \$28.94 \$33.87 \$35.76 \$33.83 \$34.61 \$32.900.00 \$4627000.00 \$36.44 \$28.94 \$33.87 \$35.77 \$35.21 \$37.77 \$54.57 \$32.900.00 \$4627000.00 \$36.44 \$28.94 \$33.87 \$35.77 \$54.57 \$32.900.00 \$4628900.00 \$33.64 \$27.70 \$36.31 \$37.25 \$33.77 \$54.57 \$32.900.00 \$4628900.00 \$33.64 \$27.70 \$36.31 \$37.25 \$33.77 \$54.57 \$32.900.00 \$4628900.00 \$33.64 \$27.70 \$35.34 \$33.87 \$33.74 \$54.54 \$32.900.00 \$4628900.00 \$37.86 \$29.49 \$33.87 \$33.74 \$54.54 \$32.900.00 \$4628900.00 \$33.64 \$27.70 \$35.24 \$33.60 \$33.64 \$37.70 \$35.24 \$33.60 \$35.60 \$35.60 \$37.70 \$35.20 \$33.60 \$33.74 \$34.54 \$34.90 \$33.74 \$34.54 \$34.90 \$33.74 \$34.54 \$34.90 \$33.74 \$34.54 \$34.90 \$33.74 \$34.54 \$34.90 \$33.74 \$34.54 \$34.90 \$33.74 \$34							
1923-100.00 46627000.00 35.26 31.08 35.94 34.09 54.89 32.9900.00 4662700.00 33.68 33.11 35.24 34.01 54.81 32.9900.00 4662700.00 33.68 33.11 35.24 34.00 54.80 32.9900.00 4662600.00 31.53 30.13 40.28 34.00 54.80 32.9790.00 4662600.00 31.53 30.13 40.28 34.00 54.80 32.9790.00 4626000.00 33.49 26.99 41.46 33.95 54.75 32.9600.00 4627000.00 33.49 34.74 32.9900.00 4627000.00 35.30 31.50 35.01 33.94 54.74 32.9900.00 4627000.00 35.30 31.50 35.01 33.94 54.74 32.9900.00 4627000.00 34.02 22.72 39.88 33.81 54.67 32.9000.00 4627000.00 34.02 22.72 39.88 33.81 54.67 32.9000.00 4627000.00 36.44 28.94 36.19 33.86 54.66 32.9900.00 4627000.00 36.44 28.94 36.19 33.86 54.66 32.9900.00 4627000.00 35.30 33.35 35.76 33.81 54.67 32.9900.00 462800.00 32.96 33.35 35.76 33.81 54.63 32.9900.00 462800.00 32.96 33.35 35.76 33.81 54.63 32.9900.00 462500.00 36.24 31.71 33.33 33.82 54.62 32.9900.00 462500.00 36.24 31.71 33.33 33.82 54.63 32.9900.00 462500.00 36.24 31.71 33.33 33.82 54.63 32.9900.00 462500.00 36.24 31.71 33.33 33.82 54.63 32.9900.00 462500.00 36.24 31.71 33.33 33.82 54.63 32.9900.00 462500.00 33.04 37.25 33.75 54.55 32.9900.00 462700.00 33.04 33.24 33.25 33.27 34.57				<u> </u>			
1924 00.00 4625 00.00 33.69 76.81 42.36 34.09 53.89 325900.00 4625 00.00 33.68 33.11 35.24 34.01 54.81 32590.00 4626 00.00 33.69 26.59 41.46 33.55 34.75 32590.00 4626 00.00 33.49 26.59 41.46 33.55 34.73 32590.00 4626 00.00 33.49 26.59 41.46 33.55 34.73 32590.00 4626 00.00 33.49 26.59 41.46 33.55 34.74 32590.00 4626 00.00 32.47 31.08 38.13 33.89 54.69 32590.00 4626 00.00 32.47 31.08 38.13 33.89 54.69 32590.00 4627 00.00 33.44 33.71 34.01 33.86 54.66 32590.00 4627 00.00 33.44 33.71 34.01 33.86 54.66 32590.00 4627 00.00 36.44 28.94 36.17 33.86 34.66 32590.00 4627 00.00 36.44 28.94 36.17 33.86 34.66 32590.00 4627 00.00 36.44 28.94 36.17 33.86 34.66 32590.00 4627 00.00 36.44 28.94 36.17 33.86 34.66 32590.00 4627 00.00 36.44 28.94 37.25 33.81 54.63 32440.00 4627 00.00 36.44 27.31 40.97 37.77 54.57 32500.00 4627 00.00 36.44 27.31 40.97 37.77 54.57 32500.00 4627 00.00 33.64 27.31 40.97 37.77 54.57 32590.00 4627 00.00 33.64 27.31 40.97 37.77 54.57 32590.00 4627 00.00 37.66 29.49 33.37 33.77 54.55 32590.00 4627 00.00 37.66 29.49 33.37 33.77 54.55 32590.00 4627 00.00 37.66 29.49 33.37 33.77 54.55 32590.00 4627 00.00 37.66 29.49 33.37 33.77 34.55 32590.00 4627 00.00 33.60 37.60 3				£			
325900.00 462700.00 05 33.68 33.11 35.24 34.01 \$4.81 32.99 32.99 34.90 34.00 462600.00 31.59 31.59 30.13 40.28 34.00 54.80 32.99 32.							
1324900.00 452600.00 31.58 30.13 40.28 34.00 54.80 324750.00 4626000.00 33.49 26.90 41.46 33.55 54.75 32500.00 462700.00 33.49 26.90 41.46 33.55 54.75 32500.00 462700.00 33.49 34.74 31.50 35.01 33.34 34.74 32600.00 462700.00 32.247 31.68 38.13 33.39 54.69 32100.00 462700.00 33.44 34.74 31.68 38.13 33.39 54.69 32100.00 462700.00 33.44 33.37 34.01 33.36 54.66 323800.00 462700.00 33.44 28.94 36.19 33.36 54.66 323800.00 4626800.00 32.36 33.36 35.76 33.33 54.63 324800 4626800.00 32.36 33.36 35.76 33.33 34.63 34.63 32500.00 462700.00 36.24 29.69 35.24 33.33 34.63 34.63 32500.00 462700.00 36.24 29.69 35.24 33.33 34.63 34.63 32500.00 462700.00 33.04 27.31 40.97 33.77 54.57 32500.00 462700.00 33.04 27.31 40.97 33.77 54.57 32500.00 462700.00 37.86 29.49 33.87 33.74 54.54 37500.00 462700.00 37.86 29.49 33.87 33.74 54.54 37500.00 462700.00 37.86 29.49 33.87 33.74 54.54 37500.00 462700.00 37.86 29.49 33.87 33.74 54.54 37500.00 462700.00 37.86 29.49 37.70 36.34 37.25 37.75 34.57 32400.00 462700.00 37.86 29.49 37.70 36.44 37.22 34.52 37.60 37.60 37.70 3						1	
1324500.00 4622700.00 33.49 26.90 41.46 33.95 54.75 1325600.00 4622700.00 35.30 31.50 35.01 33.94 54.74 132600.00 4622700.00 32.47 31.08 33.13 33.93 54.69 132600.01 4622700.00 34.02 27.77 39.88 33.37 54.67 132500.00 4622700.00 33.44 22.97 31.08 33.73 44.01 33.46 54.66 132580.00 4622700.00 36.44 28.94 36.19 33.86 54.66 132580.00 4622700.00 36.44 28.94 36.19 33.86 54.63 132560.00 4622700.00 36.44 28.94 36.19 33.86 54.63 132560.00 4622700.00 36.54 29.69 55.24 33.33 54.63 132500.00 462700.00 36.54 29.69 55.24 33.33 54.63 132500.00 462700.00 36.54 29.69 55.24 33.33 54.63 132500.00 462500.00 36.21 31.71 33.53 33.32 54.62 132500.00 462500.00 36.21 31.71 33.53 33.32 54.62 132500.00 462500.00 36.24 39.69 33.77 54.57 132500.00 462500.00 36.24 31.70 36.31 37.72 53.37 54.55 132500.00 462500.00 37.86 29.49 33.87 33.77 54.57 132500.00 462700.00 37.86 29.49 33.87 33.71 54.51 132500.00 462700.00 37.86 29.49 33.87 33.71 54.51 132500.00 462700.00 37.86 29.49 33.87 33.71 54.51 132500.00 462700.00 37.86 29.49 33.87 33.71 54.51 132500.00 462700.00 37.86 29.49 33.87 33.71 54.51 132500.00 462700.00 37.86 29.49 33.87 33.71 54.51 132500.00 462700.00 37.86 29.49 33.87 33.71 54.51 132500.00 462700.00 37.86 29.49 33.87 33.71 54.51 132500.00 462700.00 37.86 29.49 33.87 33.71 54.51 132500.00 462700.00 37.71 97.00 36.31 37.70 36.48 33.72 54.52 132500.00 462700.00 33.86 29.49 33.87 33.71 54.51 132500.00 462600.00 33.71 97.00 36.40 37.70 36.20 37.70 36.20 37.70 36.20 37.70 36.20 37.70 36.20 37.70 36.20 37.70 36.20 37.70 36.20 37.70 36.20 37.70 36.20 37.70 36.20 37.70 36.20 37.70 36.20 37.70 36.20 37.70 36.20 37.70 37.70 36.20 37.70						1	
325600.00 462700.00 33.00 31.50 31.50 33.34 54.74							
124900.00 462600.00 132.47 33.08 38.13 33.89 54.69 224600.00 462700.00 134.02 27.72 39.88 33.87 54.67 32100.00 462700.00 33.34 33.73 14.01 33.86 54.66 32550.00 462700.00 36.44 28.94 36.19 33.86 54.66 32550.00 462700.00 36.44 28.94 36.19 33.86 54.66 32550.00 462700.00 36.44 28.94 36.19 33.86 54.66 32550.00 462700.00 36.54 29.69 35.24 33.83 54.63 22500.00 462500.00 36.21 31.71 33.53 33.83 54.63 22500.00 462500.00 36.21 31.71 33.53 33.83 54.63 22500.00 462500.00 36.21 31.71 33.53 33.87 54.63 22500.00 462600.00 36.21 31.71 33.53 33.87 54.63 22500.00 462600.00 33.04 27.31 40.97 33.77 54.57 324902.20 4627187.20 27.70 36.31 37.25 33.75 54.55 32500.00 4626700.00 37.86 29.49 33.87 33.74 54.54 32500.00 4626700.00 37.86 29.49 33.87 33.74 54.54 32500.00 4626700.00 37.86 29.49 33.87 33.74 54.54 32500.00 4626700.00 37.86 29.49 33.87 33.74 54.54 32500.00 4626700.00 33.00 33.00 33.70 35.80 33.00 33.70 35.40 33.80 33.70 35.40 33.80 33.70 35.40 33.80 33.70 35.40 33.80 33.70 35.40 33.80 33.70 35.40 33.80 33.70 35.40 33.80 33.70 35.40 33.80 33.70 35.40 33.80 33.70 35.40 33.80 33.70 35.40 33.70 35.40 33.70 35.40 35.80 35.40 35.80 3							
1234601.00 4627400.00 33.44 33.73 34.01 33.86 54.66 325500.00 4627000.00 33.44 33.73 34.01 33.86 54.66 325500.00 4627000.00 36.44 28.94 36.10 33.86 54.66 325500.00 462800.00 32.36 33.36 35.76 33.83 54.63 32500.00 462800.00 32.36 33.36 35.76 33.83 54.63 32500.00 462500.00 36.24 33.71 33.53 33.82 54.63 32500.00 462500.00 33.04 27.31 40.97 33.77 54.57 32500.00 4625500.00 36.24 33.84 37.25 33.75 54.55 325500.00 4625500.00 37.86 29.49 33.87 33.74 54.54 32500.00 4625500.00 32.84 33.26 33.87 33.74 54.54 32500.00 4627500.00 32.84 33.26 33.87 33.74 54.54 32500.00 4627500.00 32.84 33.26 33.50 33.70 33.71 54.53 32500.00 4627500.00 33.86 29.49 33.87 33.74 54.54 32500.00 4627500.00 33.86 29.49 33.87 33.74 54.54 32500.00 4627500.00 33.86 29.49 33.87 33.74 54.54 32500.00 4627500.00 35.86 29.70 35.24 33.60 54.40 54.41 324385.20 4627355.30 33.00 31.70 36.48 33.72 54.52 32500.00 4627500.00 35.86 29.70 35.24 33.60 54.41 324385.20 4627355.10 36.11 29.95 34.74 33.60 54.41 324385.20 4627355.10 36.11 29.95 34.74 33.60 54.43 32500.00 462600.00 34.41 28.28 38.05 33.58 54.38 32500.00 462600.00 34.41 28.28 38.05 33.58 54.38 32500.00 462600.00 34.41 28.28 38.05 33.58 54.38 32500.00 462600.00 34.41 28.28 38.05 33.58 54.38 32500.00 462600.00 34.41 33.24 34.60 34.55 33.35 54.15 32400.00 462600.00 34.41 33.24 33.51 33.35 54.15 32400.00 462600.00 34.41 33.24 33.51 33.35 54.15 32400.00 462600.00 34.41 33.44 34.26 34.55 33.35 34.15 33.35 34.15 34.34 32500.00 462600.00 34.51 33.51 33.50							
323800.00 4625900.00 32.36 33.36 35.76 33.83 54.63 32406.00 4625900.00 36.21 31.71 33.53 33.82 54.62 32500.00 4625900.00 36.21 31.71 33.53 33.82 54.62 32400.00 462600.00 33.04 27.31 40.97 33.77 54.57 32500.00 46267300.00 37.86 29.49 33.87 33.77 54.55 32500.00 4625750.00 37.86 29.49 33.87 33.74 54.54 32500.00 46267300.00 32.84 32.84 32.26 35.10 33.73 54.53 32500.00 4627300.00 32.84 32.84 32.26 35.10 33.71 54.52 32500.00 4627300.00 33.86 29.49 33.87 33.74 54.54 32500.00 4627300.00 33.86 29.49 33.87 33.74 54.54 32500.00 4627300.00 33.86 29.70 35.24 33.60 33.70 54.52 32500.00 4627300.00 33.86 29.70 35.24 33.60 33.70 54.40 32500.00 4627300.00 33.86 29.70 35.24 33.60 33.70 54.40 32500.00 4627300.00 33.86 29.89 34.52 33.30 33.60 33.71 32.89 34.62 33.61 54.44 32.33 32.30	323100,00	4627400.00	33,84	33,73	34.01	33.86	54.66
132406.00 14627302.60 36.54 29.69 35.24 33.81 54.63 132500.00 14625500.00 36.23 31.71 33.53 33.82 54.63 132460.00 14626100.00 33.04 27.31 49.97 33.77 54.57 1324972.20 1467187.20 27.70 36.31 37.25 33.75 54.55 132500.00 14625750.00 37.86 29.49 33.87 33.74 54.54 1325300.00 14626750.00 32.84 33.26 35.10 33.71 54.53 1325300.00 14626800.00 32.84 33.26 35.10 33.71 54.53 132600.00 14627500.00 33.86 29.70 36.48 33.72 54.52 132400.00 14627500.00 35.86 29.70 35.28 33.61 54.41 1324385.20 14627353.10 36.11 29.95 34.74 33.60 54.41 1324385.20 14627334.30 36.36 29.89 34.52 33.39 54.39 1324900.00 14626400.00 34.41 23.28 33.05 33.38 54.39 1324900.00 14626400.00 34.41 23.28 33.05 33.38 54.39 1324900.00 14626400.00 34.23 32.91 36.57 33.57 54.37 1324800.00 146286800.00 34.23 32.91 36.57 33.57 54.31 1324800.00 146286800.00 34.24 34.26 34.55 33.35 54.15 1324800.00 146286800.00 34.12 34.14 34.26 34.55 33.35 54.15 1324800.00 146286800.00 34.12 34.13 34.90 35.44 33.33 54.15 1324800.00 146286800.00 34.12 34.13 34.90 34.74 30.20 33.11 33.35 54.15 1324800.00 146286800.00 34.12 34.13 34.26 34.55 33.35 54.15 1324800.00 146286800.00 34.12 34.13 34.20 33.51 54.31 1324800.00 146286800.00 34.12 34.13 34.20 33.51 54.31 1324800.00 146286800.00 34.12 34.13 34.20 33.51 54.31 1324800.00 146286800.00 34.12 34.13 34.20 33.51 54.31 1324800.00 146286800.00 34.12 34.13 34.20 33.31 54.15 1324800.00 146286800.00 34.12 34.13 34.30 33.19 33.39 1324800.00 146286800.00 33.20 30.95 30.86 30.86 33.50 33.18 33.39 1324800.00 146286800.00 33.20 30.95 30.86 30.45 30.45 30.45 30.45 30.45 30.45 30.45 30.						33.86	
325000.00 462590.00 33.04 37.1 33.53 33.82 54.62 32400.00 4626100.00 33.04 27.31 40.97 33.77 54.57 34.57 324972.00 4627890.00 37.86 29.49 33.87 33.74 54.54 32500.00 4627890.00 37.86 29.49 33.87 33.74 54.54 32500.00 462790.00 37.86 29.49 33.87 33.74 54.54 32500.00 462790.00 32.84 33.26 35.10 33.71 54.53 32600.87 4627150.30 33.00 31.70 36.48 33.72 54.52 32400.00 4627190.00 35.86 29.70 35.28 33.61 54.41 32530.00 4626800.00 33.71 32.50 34.62 33.61 54.41 324852.00 4627335.10 36.11 29.95 34.74 33.60 51.40 324852.00 4627334.10 36.36 29.89 34.52 33.59 54.39 324900.00 4626100.00 34.41 28.28 38.05 33.58 54.38 32500.00 4626400.00 34.41 28.28 38.05 33.57 54.37 324800.00 4627334.00 36.60 29.82 34.10 33.51 54.31 324800.00 4627330.00 31.24 34.26 34.10 33.51 54.31 324800.00 4626300.00 34.74 30.20 33.51 54.31 324800.00 4626300.00 34.74 30.20 33.51 54.31 324800.00 4626300.00 34.74 30.20 35.11 33.35 54.15 33341.00 36.60 29.82 34.10 33.51 54.31 324800.00 4627300.00 34.22 31.13 34.30 33.19 53.99 324900.00 462600.00 34.12 31.13 34.30 33.19 53.99 324900.00 462600.00 34.12 31.13 34.30 33.19 53.99 324900.00 462600.00 34.22 31.13 34.30 33.19 53.99 324900.00 462600.00 34.22 31.13 34.30 33.19 53.99 324900.00 462600.00 34.22 31.13 34.30 33.19 53.99 324900.00 462600.00 34.12 31.13 34.30 33.19 53.99 324900.00 462600.00 34.22 34.10 34.74 30.20 35.11 33.35 54.15 33.35 54.15 33.30 33.80 33							
324600.00 4626100.00 33.04 27.31 40.97 33.77 54.57 32.460.00 4627187.00 27.70 36.31 37.25 33.75 54.55 32.550.00 4625750.00 37.86 29.49 33.87 33.74 54.54 32.550.00 4625750.00 32.84 33.26 35.10 33.73 54.53 32.600.00 4626730.00 33.80 33.00 31.70 36.48 33.72 54.52 32.4400.00 462730.00 35.86 29.70 35.28 33.61 54.41 32.500 00 4626800.00 33.71 32.50 34.62 33.61 54.41 32.50 34.62 33.61 54.41 32.500 00 4626800.00 33.71 32.50 34.62 33.61 54.41 32.439.53 04.627331.00 36.11 29.95 34.74 33.60 54.40 32.439.53 04.627331.00 36.11 29.95 34.74 33.60 54.40 32.439.50 04.626800.00 34.41 28.28 38.05 33.58 54.39 32.4400.00 4626800.00 34.41 28.28 38.05 33.58 54.39 32.4400.00 4626800.00 34.23 32.91 36.57 33.57 54.37 32.4400.00 4626800.00 34.23 32.91 36.57 33.57 54.37 32.4400.00 4626800.00 34.23 32.91 36.57 33.57 54.37 32.4400.00 4626800.00 34.23 32.91 36.57 33.57 54.37 32.4400.00 4626800.00 34.23 32.91 36.57 33.57 54.37 32.4400.00 4626800.00 34.23 32.91 36.57 33.57 54.37 32.4400.00 4626800.00 34.23 32.91 36.57 33.57 54.37 32.4400.00 4627300.00 36.60 29.82 34.10 33.51 54.31 32.4400.00 4627300.00 36.60 29.82 34.10 33.51 54.31 32.4400.00 4627300.00 33.26 31.28 32.500.00 462800.00 34.23 32.500 33.26 31.28 35.44 32.50 33.39 54.15 32.4400.00 4627300.00 33.26 31.28 35.44 32.50 33.39 54.15 32.4400.00 4627300.00 33.26 31.28 35.44 33.33 54.15 32.4400.00 4627300.00 33.26 31.28 35.44 33.33 54.15 32.500.00 462600.00 33.26 31.28 35.44 33.33 54.15 32.500.00 462600.00 32.52 30.51 33.57 33.44 33.39 53.99 32.4600.00 462600.00 32.52 33.50 33.50 33.80 33.							
324972.20 4627187.20 37.80 36.31 37.25 33.75 54.55 32550.00 4625750.00 37.86 29.49 33.87 33.74 54.54 325300.00 4625950.00 32.84 32.84 33.26 33.10 33.71 54.53 326008.30 4627350.30 33.00 31.70 36.48 33.72 54.52 324400.00 4627300.00 35.86 29.70 35.28 33.61 54.41 32.4355.20 4627351.01 36.11 29.95 34.74 33.60 54.41 32.4355.20 4627351.01 36.11 29.95 34.74 33.60 54.41 32.4355.20 4627335.10 36.11 29.95 34.74 33.60 54.49 32.490.00 4626100.00 34.41 28.28 38.05 33.58 54.39 32.4900.00 4626100.00 34.41 28.28 38.05 33.58 54.38 32.500.00 4626300.00 34.23 32.30 32.91 36.57 33.57 54.37 32.400.00 462800.00 34.23 32.91 36.57 33.51 54.31 32.4800.00 462800.00 34.23 32.91 36.57 33.51 54.31 32.4800.00 462800.00 34.23 32.91 36.50 33.51 54.31 32.4800.00 462800.00 34.23 32.91 36.50 33.51 54.31 32.4800.00 462800.00 34.74 30.20 35.11 33.35 54.15 32.4800.00 462800.00 34.74 30.20 35.11 33.35 54.15 32.4800.00 462800.00 34.74 30.20 35.11 33.35 54.15 32.4800.00 462800.00 34.74 30.20 35.11 33.35 54.15 32.4800.00 462800.00 34.74 30.20 35.11 33.35 54.15 32.4800.00 462800.00 34.74 30.20 35.11 33.35 54.15 32.5000.00 462800.00 34.74 30.20 35.11 33.35 54.15 32.5000.00 462800.00 34.51 32.80 30.00 34.74 30.20 35.11 33.35 54.15 32.5000.00 462800.00 34.51 32.80 30.90 33.60 31.28 35.44 33.30 35.44 33.30 35.49 32.500.00 462800.00 34.51 32.80 30.90 33.60 31.28 35.44 33.30 35.44 33.30 35.49 32.500.00 462800.00 34.51 32.80 30.90 30.95 32.69 35.90 33.18 53.90 33.18 53.90 32.60 30.90 30.95 32.60 30.95 32.69 35.90 33.18 53.90 33.18 53.90 32.500.00 462200.00 32.52 30.51 36.63 33.00 35.80 33.5		TITIT					
325500.00 4625750.00 37.86 29.49 33.87 33.74 54.54 32300.00 4627500.00 32.84 33.26 35.10 33.71 54.53 326008.30 4627500.00 32.84 33.26 35.10 33.71 54.53 326008.30 4627300.00 35.86 29.70 35.28 33.61 54.41 325300.00 4627300.00 35.86 29.70 35.28 33.61 54.41 325300.00 4626800.00 33.71 32.50 34.62 33.61 54.41 325300.00 4627331.00 36.11 29.95 34.74 33.60 55.40 324395.30 4627331.00 36.36 29.89 34.52 33.59 54.39 324900.00 4626100.00 34.41 28.28 38.05 33.88 54.38 325900.00 4626100.00 34.41 28.28 38.05 33.88 54.38 325900.00 4626400.00 34.23 32.91 36.57 33.57 54.37 324406.60 4627334.00 36.60 29.82 34.10 33.51 54.31 324800.00 46273601.00 31.24 34.26 34.55 33.35 54.15 334341.90 4627396.40 34.74 30.20 35.11 33.35 54.15 334341.90 4627396.40 34.74 30.20 35.11 33.35 54.15 332600.00 462600.00 33.26 31.28 35.44 33.33 55.13 32600.00 4627300.00 33.26 31.28 35.44 33.33 55.13 325000.00 4627300.00 33.26 31.28 35.44 33.33 55.13 325000.00 4627300.00 33.26 31.28 35.44 33.31 55.13 325000.00 4627300.00 33.26 31.28 35.44 33.33 55.13 325000.00 4627300.00 33.26 31.28 35.44 33.33 55.13 325000.00 4627300.00 33.26 31.28 35.44 33.33 55.13 325000.00 462700.00 33.26 31.28 35.44 33.33 55.13 325000.00 462700.00 33.26 31.28 35.90 33.18 33.99 324700.00 462700.00 33.25 31.77 36.99 33.17 33.97 32300.00 462700.00 33.25 31.77 36.99 33.17 33.97 32300.00 462700.00 33.25 31.77 36.99 33.17 33.97 32300.00 462700.00 33.26 31.27 36.91 36.42 33.10 33.90 323200.00 462700.00 33.30 32.22 30.51 36.37 33.14 53.94 323100.00 462700.00 33.30 32.22 30.51 36.37 33.14 53.94 323100.00 462700.00 33.30 32.22 30.51 36.37 33.14 53.90 323200.00 462700.00 33.30 32.22 30.51 36.37 33.14 53.99 323200.00 462700.00 33.30 32.22 30.51 36.37 33.14 53.90 323200.00 462700.00 33.30 32.22 30.51 36.81 33.10 33.00 33.85 324700.00 462700.00 33.30 32.22 30.62 36.81 33.10 33.00 33.85 324700.00 462700.00 33.30 32.22 30.62 36.81 33.00 33.85 324700.00 462700.00 33.30 32.22 30.62 36.81 33.00 33.85 324700.00 462600.00 30.93 32.22 30.62 31.40 33.40 33.99 33.99 33.79 32400.00 462600.00 33.33 30.00 33.80 33							
325300.00 4626800.00 32.84 33.26 35.10 33.73 54.53 32600.00 4627300.00 35.86 29.70 35.24 33.61 54.44 32.5300.00 4626800.00 33.71 32.50 34.62 33.61 54.44 32.5300.00 4626800.00 33.71 32.50 34.62 33.64 54.44 32.5300.00 4626800.00 33.71 32.50 34.62 33.64 54.44 32.5300.00 46267335.10 36.11 29.95 34.74 33.60 54.40 32.4395.30 4627334.30 36.36 29.89 34.52 33.59 54.39 32.4900.00 4626100.00 34.41 28.28 38.05 33.58 54.38 32.5000.00 4626400.00 34.23 32.91 36.57 33.57 54.37 32.4800.00 4626400.00 34.23 32.91 36.57 33.51 54.31 32.4800.00 4626400.00 34.24 34.26 34.26 34.55 33.35 54.15 32.4800.00 462600.00 34.24 34.26 34.26 34.55 33.35 54.15 32.4800.00 4627300.00 33.26 31.28 32.4900.00 462600.00 33.26 31.28 32.4900.00 462600.00 34.29 32.40 34.20 33.51 54.31 32.4800.00 462600.00 34.21 32.30 32.91 36.57 33.35 54.15 32.4800.00 462600.00 34.23 32.91 36.57 33.35 54.15 32.4800.00 462600.00 34.24 34.26 34.55 33.35 54.15 32.4800.00 462600.00 34.24 34.26 34.55 33.35 54.15 32.4800.00 462600.00 34.24 34.26 34.55 33.35 54.15 32.6000.00 462600.00 34.25 32.6000.00 462600.00 34.25 32.6000.00 462600.00 34.25 32.6000.00 462600.00 34.25 32.30 32.6000.00 462600.00 34.25 32.30 32.6000.00 462600.00 34.51 32.30 32.6000.00 462600.00 34.51 32.30 32.5000.00 462600.00 32.52 33.59 32.6000.00 462600.00 32.52 33.50 32.50							
326008.30 4627350.30 33.00 31.70 36.48 33.72 54.52 324400.00 4627300.00 35.86 29.70 35.28 33.61 54.41 323530.00 4626800.00 33.71 32.50 34.62 33.61 54.41 324385.20 4627335.10 36.11 29.95 34.74 33.60 54.40 324395.30 4627334.30 36.36 29.89 34.52 33.59 54.39 324900.00 4626100.00 34.41 282.88 38.05 33.58 54.38 325900.00 4626100.00 34.41 282.8 38.05 33.58 54.38 325900.00 4626300.00 34.23 32.91 36.57 33.57 54.37 324406.60 4627334.00 36.60 29.82 34.10 33.51 54.31 324800.00 4626300.00 34.24 34.26 34.55 33.55 54.15 324800.00 462800.00 34.24 34.26 34.55 33.35 54.15 32490.00 4627356.40 34.74 30.20 35.41 33.35 54.15 326000.00 4627306.00 33.26 31.28 35.44 33.33 55.41 325000.00 4626600.00 34.12 31.31 34.30 33.19 55.99 324600.00 4626600.00 34.12 31.31 34.30 33.19 55.99 324600.00 4626600.00 30.95 32.69 35.90 33.17 33.98 324600.00 462600.00 30.95 32.69 35.90 33.17 33.98 324600.00 4627300.00 33.26 31.28 35.44 33.33 54.13 323600.00 4626600.00 30.95 32.69 35.90 33.18 33.99 324600.00 462600.00 30.95 32.69 35.90 33.17 33.99 324600.00 4627300.00 33.26 31.77 36.99 33.17 33.97 323600.00 4627300.00 33.52 33.51 36.37 33.14 53.94 323600.00 4627300.00 33.52 33.51 36.37 33.14 53.94 323600.00 4627300.00 33.50 33.60 33.51 36.37 33.14 53.94 323600.00 4627300.00 33.51 36.37 33.14 53.94 323600.00 4627300.00 33.50 33.60 33.50 33.80 33.99 33.87 323600.00 4627400.00 33.70 32.20 33.29 33.06 53.86 32500.00 4627400.00 33.70 32.20 33.29 33.06 53.86 32500.00 4627400.00 33.70 32.42 30.62 36.81 33.10 53.99 323600.00 4627400.00 33.80 30.36 31.40 37.25 33.00 53.80 323600.00 462600.00 30.32 33.83 30.85 37.94 33.00 53.80 323600.00 462600.00 30.32 33.83 30.88 37.94 33.00 53.80 323600.00 462600.00 30.32 33.83 30.88 37.94 33.00 53.80 323600.00 462600.00 30.32 33.83 30.88 37.94 33.00 53.80 323600.00 462600.00 33.83 30.38 34.76 32.99 53.79 323600.00 462600.00 33.83 30.38 34.76 32.99 53.79 323600.00 462600.00 33.83 30.38 34.76 32.99 53.79 324600.00 462600.00 32.03 38.3 30.38 34.76 32.99 53.79 32500.00 462600.00 32.23 32.20 30.24 36.67 32.98 53.78 32500.00 462600.00	$\overline{}$						
324406.00 4627300.00 35.86 29.70 35.28 33.61 54.41 52.300.00 4626800.00 33.71 32.50 34.62 33.61 54.41 32.485.20 4627351.00 36.11 29.95 34.74 33.60 54.40 32.485.20 4627351.00 36.11 29.95 34.74 33.60 54.40 32.485.20 4627351.00 36.11 29.95 34.74 33.60 54.40 32.495.30 4627334.30 36.36 29.89 34.52 33.39 54.39 32.4900.00 462600.00 34.41 28.28 38.05 33.88 54.38 32.500.00 462600.00 34.23 32.91 36.57 33.57 54.37 32.4406.60 4627334.00 36.60 29.82 34.10 33.51 54.31 32.4800.00 4627300.00 34.24 34.26 34.26 34.55 33.35 54.15 32.4341.90 4627300.00 34.74 30.20 35.11 33.35 54.15 32.4341.90 4627300.00 33.26 31.28 35.44 33.33 54.15 32.4341.90 4627300.00 34.12 31.13 34.30 33.19 53.99 32.4600.00 462800.00 34.12 31.13 34.30 33.19 53.99 32.4600.00 462600.00 30.75 31.77 36.99 33.17 33.97 32.400.00 4627300.00 32.52 30.51 36.37 33.44 53.94 32.300.00 4627300.00 34.54 28.38 36.42 33.17 33.97 32.300.00 4627300.00 34.54 28.38 36.42 33.10 53.90 32.300.00 4627300.00 30.75 31.77 36.99 33.17 33.97 32.300.00 4627300.00 34.54 28.38 36.42 33.10 53.90 32.300.00 4627300.00 34.54 28.38 36.42 33.10 53.90 32.300.00 4627300.00 34.54 28.38 36.42 33.10 53.90 32.300.00 4627300.00 34.55 28.38 36.42 33.10 53.90 32.300.00 4627300.00 34.55 28.38 36.42 33.10 53.90 32.300.00 4627300.00 34.55 28.38 36.42 33.10 53.90 32.300.00 4627300.00 34.55 28.38 36.42 33.10 53.90 32.300.00 4627300.00 34.55 28.38 36.42 33.10 53.90 32.300.00 4627300.00 34.55 28.38 36.42 33.10 53.90 32.300.00 4627300.00 33.30 34.55 38.55 33.64 33.00 53.85 33.60 32.300.00 4627300.00 33.30 34.54 38.60 27.62 36.61 33.00 53.80 32.300.00 4627300.00 33.30 34.54 38.60 27.62 36.61 33.00 53.80 32.300.00 4627300.00 33.30 34.54 36.60 27.62 36.61 33.00 53.80 32.300.00 4627400.00 33.30 34.86 27.62 36.61 33.00 53.85 33.85 32.400.00 4627400.00 33.30 34.86 27.62 36.61 33.00 53.85 33.85 32.400.00 4627400.00 33.30 32.20 33.40 33.40 33.29 33.00 53.85 33.85 32.400.00 462600.00 33.30 33.30 33.83 34.40 33.29 33.30 53.85 33.85 33.400 33.80 33.80 33.80 33.80 33.80 33.80 33.80 33.80 33.80 33.80 33.80 33.80 33.80 33.80 33							
325300.00 4626800.00 33.71 32.50 34.62 33.61 54.41 33.85 32.45 33.50 54.41 33.85 30 4627335.10 36.11 29.95 34.74 33.60 54.40 32.45 33.59 54.39 32.45 33.50 4626.00 34.23 32.50 32.60 29.82 34.10 33.51 54.31 32.45							
324385.20 4627335.10 36.11 29.95 34.74 33.60 51.40 324395.30 4627334.30 36.36 29.89 34.52 33.59 54.39 324900.00 4626100.00 34.41 28.28 38.05 33.58 54.38 325000.00 4626400.00 34.23 32.91 36.57 33.57 54.37 324406.60 4627334.00 36.60 29.82 34.10 33.51 54.31 324800.00 4627334.00 36.60 29.82 34.10 33.51 54.31 324800.00 4627336.00 31.73 27.96 40.82 31.51 54.31 324800.00 4627336.40 34.74 30.20 35.11 33.35 54.15 324800.00 4627330.00 33.26 31.28 35.44 33.33 54.13 325000.00 4626200.00 34.12 31.13 34.30 33.19 53.99 324700.00 4626400.00 30.75 31.77 36.99 33.17 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>							
\$\frac{324395.36}{324900.00}							
325000.00 4626400.00 31.23 32.91 36.57 33.57 54.37 32.406.60 4627334.00 36.60 29.62 34.10 33.51 54.31 32.4800.00 4626300.00 31.73 27.96 40.82 33.51 54.31 32.4800.00 4628600.00 31.74 30.20 35.51 33.35 54.15 32.434.00 4627300.00 31.74 30.20 35.51 33.35 54.15 32.6000.00 4627300.00 32.66 31.28 35.44 33.33 54.13 32.5000.00 4626200.00 34.12 31.13 34.30 33.19 53.99 32.4600.00 462600.00 30.95 32.69 35.90 33.18 53.98 32.4760.00 462600.00 32.52 30.51 36.99 33.17 33.97 32.4000.00 4627300.00 32.52 30.51 36.97 33.14 53.94 32.310.00 4627300.00 34.51 28.38 36.42 33.10 53.90 32.310.00 4627300.00 34.51 28.38 36.42 33.10 53.90 32.3200.00 4627300.00 34.51 28.38 36.42 33.10 53.90 32.3200.00 4627300.00 33.70 32.20 33.30 53.30 53.86 32.3200.00 4627300.00 33.70 32.20 33.30 53.80 53.86 32.3200.00 4627300.00 33.70 32.20 33.30 53.80 53.86 32.3200.00 4627300.00 33.70 32.20 33.30 53.80 53.86 32.3200.00 4627300.00 33.70 32.20 33.30 53.80 53.86 32.3200.00 4627300.00 33.70 32.20 33.30 53.80 53.86 32.3200.00 4627300.00 33.70 32.42 30.62 36.81 33.10 53.90 32.3200.00 4627300.00 33.70 32.20 33.30 53.86 32.320 33.06 53.86 32.320 33.06 53.86 32.320 33.06 53.86 32.320 33.06 53.86 32.320 33.06 53.86 32.320 33.06 53.86 32.320 33.06 53.86 32.320 33.06 53.86 32.320 33.06 53.86 32.320 33.06 53.86 32.320 33.06 53.86 32.320 33.06 53.86 32.320 33.06 53.86 32.320 33.06 53.86 32.320 33.06 53.86 32.320 33.06 53.86 32.320 33.06 53.85 32.400.00 4627300.00 32.22 30.83 30.32 30.83 30.95 53.85 32.400.00 4627300.00 32.22 30.83 30.93 30.44 33.05 53.85 32.400.00 462600.00 32.22 33.40 32.42 30.62 36.42 32.90 53.79 32.400.00 462600.00 32.22 33.30 32.42 30.62 36.42 32.90 53.79 32.400.00 462600.00 32.22 33.40 32							
324406.60 4627334.00 36.60 29.82 34.10 33.51 54.31 324800.00 4626300.00 31.73 27.96 40.82 33.51 54.31 324800.00 4626300.00 31.74 34.26 34.55 33.35 54.15 324341.90 462736.40 34.74 30.20 35.11 33.35 54.15 32600.00 4627300.00 33.26 31.28 35.44 33.33 54.15 32600.00 462700.00 34.12 31.13 34.30 33.19 53.99 324600.00 462600.00 30.95 32.69 35.90 33.18 53.98 324700.00 4626400.00 30.75 31.77 36.99 33.17 53.97 12300.00 462700.00 32.23 30.51 36.37 33.14 53.94 323100.00 462700.00 34.51 28.38 36.42 33.10 53.90 32300.00 462700.00 34.51 28.38 36.42 33.10 53.90 32300.00 462700.00 33.75 31.77 36.99 33.17 53.97 32300.00 462700.00 33.50 32.52 30.51 36.37 33.14 53.94 323100.00 4627300.00 34.51 28.38 36.42 33.10 53.90 32300.00 4627400.00 33.70 32.20 33.29 33.06 53.86 325700.00 4627400.00 33.70 32.20 33.29 33.06 53.86 325700.00 4627400.00 33.10 30.45 35.61 33.05 53.85 32600.00 4627400.00 33.10 30.45 35.61 33.05 53.85 32600.00 4627400.00 33.10 30.45 35.61 33.05 53.85 32600.00 462600.00 30.32 30.85 37.94 33.04 53.81 325019.50 4627400.00 33.83 30.45 35.61 33.00 53.80 323800.00 462600.00 30.32 30.85 37.94 33.04 53.81 325019.50 4627400.00 33.83 30.36 33.40 37.25 33.00 53.80 323800.00 462600.00 30.32 30.85 37.94 33.04 53.81 325019.50 4627400.00 33.83 30.38 34.76 32.99 53.79 324600.00 462600.00 32.03 30.24 36.67 32.99 53.79 324600.00 462600.00 32.03 32.05 37.93 32.99 53.79 324600.00 462600.00 32.03 32.05 37.93 32.99 53.79 324500.00 462600.00 32.03 30.24 36.67 32.98 53.78 324800.00 462600.00 32.03 32.05 37.93 32.95 53.75 324700.00 462600.00 32.03 32.05 37.93 32.95 53.75 32500.00 462600.00 32.03 30.44 32.05 37.93 32.95 53.75 32500.00 462600.00 32.03 30.44 32.05 36.35 32.95 53.75	324900.00	4626100.00	34.41	28.28	38.05	33.58	54.38
324800.00 4626300.00 31.73 27.96 40.82 33.51 54.31 324800.00 4628800.00 31.24 34.26 34.55 33.35 54.15 324341.90 4627306.00 34.74 30.20 35.11 33.35 54.15 32600.00 4627300.00 33.26 31.28 35.44 33.33 54.13 32500.00 4627300.00 34.12 31.13 34.30 33.19 55.99 324600.00 462600.00 30.95 32.69 35.90 33.18 53.98 324600.00 462600.00 30.75 31.77 36.99 33.17 53.97 32300.00 462700.00 32.52 30.51 36.37 33.14 53.94 323100.00 4627300.00 34.51 28.38 36.42 33.10 53.90 323100.00 4627300.00 34.51 28.38 36.42 33.10 53.90 32300.00 4627400.00 33.70 32.20 33.29 33.06 53.86 325700.00 4627400.00 33.70 32.20 33.29 33.06 53.86 325700.00 4627400.00 33.70 32.42 30.62 36.81 33.00 53.90 323200.00 4627400.00 33.70 32.20 33.29 33.06 53.86 325700.00 4627400.00 33.70 32.42 30.62 36.81 33.05 53.85 324700.00 462600.00 30.32 30.85 37.94 33.04 53.84 325019.50 4627186.50 30.36 31.40 37.25 33.00 53.80 323800.00 462600.00 30.32 30.85 37.94 33.04 53.84 325019.50 4627186.50 30.36 31.40 37.25 33.00 53.80 323800.00 462600.00 32.12 31.40 35.48 33.00 53.80 323800.00 462600.00 32.01 30.24 36.67 32.99 53.79 324600.00 462600.00 32.01 30.24 36.67 32.99 53.79 324600.00 462600.00 32.01 30.24 36.67 32.98 53.78 324800.00 462600.00 32.01 30.24 36.67 32.98 53.78 324800.00 462600.00 32.01 30.24 36.67 32.98 53.78 324800.00 462600.00 32.01 30.24 36.67 32.98 53.78 324800.00 462600.00 32.01 30.24 36.67 32.98 53.78 324800.00 462600.00 32.01 30.24 36.67 32.98 53.78 324800.00 462600.00 32.01 30.24 36.67 32.98 53.78 324800.00 462600.00 32.01 30.24 36.67 32.98 53.78 324800.00 462600.00 32.01 30.24 36.67 32.98 53.78 324900.00 462600.00 32.01 30.24 36.67 32.98 53.78 324900.00 462600.00 32.01 30.24 36.67 32.98 53.78 324900.00 462600.00 32.01 30.24 36.67 32.98 53.75 32500.00 462600.00 34.27 30.26 34.36 32.95 53.75 32500.00 462600.00 34.40 32.05 36.35 32.95 53.75			31.23	32.91	36.57	33.57	54.37
324500,00 462800,00 31.24 34.26 34.55 33.35 54.15 324341,90 4627306,40 34.74 30.20 35.11 33.35 54.15 32600,00 4627300,00 33.26 31.28 35.44 33.33 54.33 32500,00 4626200,00 34.12 31.13 34.30 33.19 53.99 324600,00 4626500,00 30.95 32.69 35.90 33.18 53.98 324700,00 4626400,00 30.75 31.77 36.99 33.17 53.97 12300,00 462700,00 32.52 30.51 36.37 33.14 53.94 323100,00 4627300,00 34.51 28.38 36.42 33.10 53.90 32300,00 4627400,00 34.51 28.38 36.42 33.10 53.90 32300,00 4627400,00 34.51 28.38 36.42 33.10 53.90 32300,00 4627400,00 33.70 32.20 33.29 33.06 53.86 325700,00 4627400,00 33.10 30.45 35.61 33.05 53.85 326557,80 4627351,10 32.42 30.62 36.12 33.05 53.85 324700,00 4626600,00 30.32 30.85 37.94 33.04 53.84 325019,50 4626600,00 30.32 30.85 37.94 33.00 53.80 323800,00 462600,00 30.32 30.85 37.94 33.00 53.80 323800,00 462600,00 30.32 30.85 37.94 33.00 53.80 323800,00 462600,00 30.32 30.36 31.40 37.25 33.00 53.80 323800,00 462600,00 32.12 31.40 35.48 33.00 53.80 323800,00 462600,00 32.82 31.40 35.48 33.00 53.80 323800,00 462600,00 32.62 31.40 35.48 33.00 53.80 323800,00 462600,00 32.62 31.40 35.48 33.00 53.80 323800,00 462600,00 32.62 31.40 35.48 33.00 53.80 323800,00 462600,00 32.62 31.40 35.48 33.00 53.80 323800,00 462600,00 32.62 31.40 35.48 33.00 53.80 323800,00 462600,00 32.62 31.40 35.48 32.98 53.78 324800,00 462600,00 32.03 30.24 36.67 32.98 53.79 324800,00 462600,00 32.03 32.46 33.84 32.98 53.78 324800,00 462600,00 32.03 32.46 33.84 32.98 53.78 324800,00 462600,00 32.03 32.46 33.84 32.98 53.78 324800,00 462600,00 32.42 36.67 32.98 53.78 324800,00 462600,00 32.03 32.45 32.95 53.75 325100,00 462600,00 34.27 30.24 36.67 32.98 53.75 325100,00 462600,00 36.44 32.05 36.35 32.95 53.75		4627334.00				33.51	54.31
324341.90 4627336.40 34.74 30.20 35.11 33.35 54.15 326000.00 4627300.00 33.26 31.28 35.44 33.33 54.13 325000.00 4626200.00 34.12 31.13 34.30 33.19 53.99 324600.00 4626500.00 30.95 32.69 35.90 33.18 53.98 324700.00 4626400.00 30.75 31.77 36.99 33.17 53.97 323000.00 4627000.00 32.52 30.51 36.37 33.14 53.94 323100.00 4627300.00 34.51 28.38 36.42 33.10 53.90 323000.00 4627300.00 34.51 28.38 36.42 33.10 53.90 323000.00 4627400.00 33.70 32.20 36.81 33.10 53.90 323000.00 4627400.00 33.10 30.45 35.61 33.05 53.85 326057.30 4627351.10 32.42 30.62 36.12 33.05 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>							
326000.00 4627300.00 33.26 31.28 35.44 33.33 54.13 325000.00 4626200.00 34.12 31.13 34.30 33.19 53.59 324600.00 4626500.00 30.95 32.69 35.90 33.18 53.98 324760.00 462600.00 30.75 31.77 36.99 33.17 53.97 323000.00 462700.00 32.52 30.51 36.37 33.14 53.94 323100.00 4627300.00 34.51 28.38 36.42 33.10 53.90 323000.00 4627350.00 34.51 28.38 36.42 33.10 53.90 323000.00 4627300.00 34.51 28.38 36.42 33.10 53.90 323000.00 4627300.00 34.51 28.38 36.42 33.10 53.90 323200.00 4627400.00 33.70 32.20 33.29 33.06 53.86 325700.00 4627100.00 33.10 30.45 35.61 33.05							
325000.00 4626200.00 34.12 31.13 34.30 33.19 53.99 324600.00 4626500.00 30.95 32.69 35.90 33.18 53.98 324700.00 4626400.00 30.75 31.77 36.99 33.17 53.97 323000.00 4627000.00 32.52 30.51 36.37 33.14 53.94 323100.00 4627300.00 34.51 28.38 36.42 33.10 53.90 323000.00 4627300.00 34.86 27.62 36.81 33.10 53.90 323000.00 4627400.00 33.70 32.20 33.29 33.06 53.86 325700.00 4627400.00 33.10 30.45 35.61 33.05 53.85 326057.80 4627351.10 32.42 30.62 36.12 33.05 53.85 324700.00 462600.00 30.32 30.85 37.94 33.04 53.84 32501.50 462736.50 30.36 31.40 37.25 33.00 53.80 323800.00 4626900.00 33.83 30.38 34.76 32.99 53.79 324800.00 4626900.00 33.83 30.38 34.76 32.99 53.78 324900.00 4626900.00 27.33 32.76 38.84 32.98 53.78 324900.00 4626900.00 27.33 32.76 38.84 32.98 53.78 324900.00 4626900.00 28.87 32.05 37.93 32.95 53.75 32500.00 4626900.00 28.87 32.05 37.93 32.95 53.75 32500.00 4626900.00 34.27 30.21 34.36 32.95 53.75 32500.00 4626900.00 34.27 30.21 34.36 32.95 53.75 32500.00 4626900.00 36.44 32.05 36.35 32.95 53.75							
324600.00 4626800.00 30.95 32.69 35.90 33.18 53.98 324760.00 4626400.00 30.75 31.77 36.99 33.17 53.97 323000.00 4627000.00 32.52 30.81 36.37 33.14 53.94 323100.00 4627300.00 34.51 28.38 36.42 33.10 53.90 32300.00 4627250.00 34.86 27.62 36.81 33.10 53.90 32300.00 4627400.00 33.70 32.20 33.29 33.06 53.86 325700.00 4627100.00 33.10 30.45 35.61 33.05 53.85 326057.80 4627351.10 32.42 30.62 36.12 33.05 53.85 324700.00 462600.00 30.32 30.85 37.94 33.04 53.84 325019.50 4627186.50 30.36 31.40 37.25 33.00 53.80 323800.00 4626900.00 32.12 31.40 35.48 33.00							
324700.00 462600.00 30.75 31.77 36.99 33.17 53.97			,,,,,,,				
323000.00 4627000.00 32.52 30.51 36.37 33.14 \$3.94 323100.00 4627300.00 34.51 28.38 36.42 33.10 \$3.90 323000.00 4627250.00 34.86 27.62 36.81 33.10 \$3.90 323200.00 4627400.00 33.70 32.20 33.29 33.06 \$3.86 325700.00 4627100.00 33.10 30.45 35.61 33.05 \$3.85 326057.30 4627351.10 32.42 30.62 36.12 33.05 \$3.85 324700.00 4626600.00 30.32 30.85 37.94 33.04 \$3.84 325019.50 4627186.50 30.36 31.40 37.25 33.00 \$3.80 323800.00 462690.00 32.12 31.40 35.48 33.00 \$3.80 325800.00 462700.00 33.83 30.38 34.76 32.99 \$3.79 324800.00 4626700.00 32.03 30.24 36.67 32.98							
323100.00 4627300.00 34.51 28.38 36.42 33.10 \$3.90 323000.00 4627250.00 34.86 27.62 36.81 33.10 \$3.90 323200.00 4627400.00 33.70 32.20 33.29 33.06 \$3.86 325700.00 4627100.00 33.10 30.45 35.61 33.05 \$3.85 326057.30 4627351.10 32.42 30.62 36.12 33.05 \$3.85 324700.00 4626600.00 30.32 30.85 37.94 33.04 \$3.84 325019.50 4627186.50 30.36 31.40 37.25 33.00 \$3.80 323800.00 462690.00 32.12 31.40 35.48 33.00 \$3.80 325800.00 462690.00 33.83 30.38 34.76 32.99 \$3.79 324800.00 4626700.00 33.83 30.24 36.67 32.98 53.78 324800.00 4626700.00 32.03 30.24 36.67 32.98							
3230001,00 4627250,00 34.86 27.62 36.81 33.10 53.90					<u> </u>		
323200.00 4627406.00 33.70 32.20 33.29 33.06 53.86 325700.00 4627100.00 33.10 30.45 35.61 33.05 53.85 326057.30 4627351.10 32.42 30.62 36.12 33.05 53.85 324700.00 4626600.00 30.32 30.85 37.94 33.04 53.84 325019.50 4627186.50 30.36 31.40 37.25 33.00 53.80 323800.00 4626900.00 32.12 31.40 35.48 33.00 53.80 325800.00 4626900.00 32.12 31.40 35.48 33.00 53.80 325800.00 4626900.00 33.83 30.38 34.76 32.99 53.79 324600.00 4626700.00 32.03 30.24 36.67 32.98 53.78 324800.00 4626700.00 27.33 32.76 38.84 32.98 53.78 324900.00 4626900.00 28.87 32.05 37.93 32.95 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>							
325700.00 4627100.00 33.10 30.45 35.61 33.05 53.85 326057.30 4627351.10 32.42 30.62 36.12 33.05 53.85 324700.00 4626600.00 30.32 30.85 37.94 33.04 53.84 325019.50 4627186.50 30.36 31.40 37.25 33.00 53.80 323800.00 4626900.00 32.12 31.40 35.48 33.00 53.80 325800.00 4626900.00 33.83 30.38 34.76 32.99 53.79 324600.00 4626900.00 32.03 30.24 36.67 32.98 53.78 324800.00 4626700.00 27.33 32.76 38.84 32.98 53.78 324900.00 4626900.00 28.87 32.05 37.93 32.95 53.75 325000.00 4626900.00 34.27 30.24 34.36 32.95 53.75 325000.00 4626900.00 36.34 32.95 33.75 32.55 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>							
324700.00 4626600.00 30.32 30.85 37.94 33.04 53.84 325019.50 4627186.50 30.36 31.40 37.25 33.00 53.80 323800.00 4626900.00 32.12 31.40 35.48 33.00 53.80 325800.00 4627200.00 33.83 30.38 34.76 32.99 53.79 324600.00 4626400.00 32.03 30.24 36.67 32.98 53.78 324800.00 4626700.00 27.33 32.76 38.84 32.98 53.78 324900.00 4626900.00 28.87 32.05 37.93 32.95 53.75 325100.00 4626900.00 34.27 30.24 34.36 32.95 53.75 325000.00 4626900.00 34.27 30.24 34.36 32.95 53.75 325000.00 4626300.00 36.44 32.05 36.35 32.95 53.75	325700.00	4627100.00	33,10	30.45	35.61	33.05	53.85
325019.50 4627186.50 30.36 31.40 37.25 33.00 53.80 323800.00 4626900.00 32.12 31.40 35.48 33.00 53.80 325800.00 4627200.00 33.83 30.38 34.76 32.99 53.79 324600.00 4626400.00 32.03 30.24 36.67 32.98 53.78 324800.00 4626700.00 27.33 32.76 38.84 32.98 53.78 324900.00 4626900.00 28.87 32.05 37.93 32.95 53.75 325100.00 4626900.00 34.27 30.24 34.36 32.95 53.75 325000.00 4626300.00 36.44 32.05 36.35 32.95 53.75			32,42	30.62	36.12	33.05	53.85
323800.00 4626900.00 32.12 31.40 35.48 33.00 53.80 325800.00 4627200.00 33.83 30.38 34.76 32.99 53.79 324600.00 4626400.00 32.03 30.24 36.67 32.98 53.78 324800.00 4626700.00 27.33 32.76 38.84 32.98 53.78 324900.00 4626900.00 28.87 32.05 37.93 32.95 53.75 325100.00 4626900.00 34.27 30.24 34.36 32.95 53.75 325000.00 4626300.00 36.44 32.05 36.35 32.95 53.75		········ · · · · · · · · · · · · · · ·					
325800.00 4627200.00 33.83 30.38 34.76 32.99 53.79 324600.00 4626400.00 32.03 30.24 36.67 32.98 53.78 324800.00 4626700.00 27.33 32.76 38.84 32.98 53.78 324900.00 4626900.00 28.87 32.05 37.93 32.95 53.75 325100.00 4626900.00 34.27 30.24 34.36 32.95 53.75 325000.00 4626300.00 36.44 32.05 36.35 32.95 53.75							
324600.00 4626400.00 32.03 30.24 36.67 32.98 53.78 324800.00 4626700.00 27.33 32.76 38.84 32.98 53.78 324900.00 4626900.00 28.87 32.05 37.93 32.95 53.75 325100.00 4626900.00 34.27 30.24 34.36 32.95 53.75 325000.00 4626300.00 36.44 32.05 36.35 32.95 53.75							
324800.00 4626700.00 27.33 32.76 38.84 32.98 53.78 324900.00 4626900.00 28.87 32.05 37.93 32.95 53.75 325100.00 4626900.00 34.27 30.24 34.36 32.95 53.75 325000.00 4626300.00 36.44 32.05 36.35 32.95 53.75				-1			
324900.00 4626900.00 28.87 32.05 37.93 32.95 53.75 325100.00 4626900.00 34.27 30.24 34.36 32.95 53.75 325000.00 4626300.00 36.44 32.05 36.35 32.95 53.75							
325100,00 4626900,00 34.27 30.24 34.36 32.95 53.75 325000,00 4626300,00 36.44 32.05 36.35 32.95 53.75							
325000,00 4626300,00 36.44 32.05 36.35 32.95 53.75	\longrightarrow						
		4626900.00	31,19	32.20	35.39	32.93	53.73
324500.00 4626400.00 32.01 32.08 34.65 32.92 53.72							
324307.30 4627338.40 33.44 30.41 34.89 32.91 53.71							
324900.00 4626700.00 27.20 33.46 38.00 32.89 53.69							

UTM(E)	UTAL(N)	2008 Concentration ¹	2009 Concentration	2010 Concentration	3-yr Average	3-yr Average + Background
(m)	(m)	(ug/m ^d)	(ug/m ³)	(ug/m²)	(ng/m³)	(ug/m³)
1					32.87	\$3.67
3243B(J,(#)	4627200.00 4626300.00	30.88 30.45	30.30 28.21	37,43 39,95	32.87	\$3.67
	4628100.00	32.36	32.82	33,35	32.85	53.65
		31,12	34.03	33.32	32,82	53.62
	4626900.00	33,23	29.19	35.98	32,80	53.60
	4624250.00	35.47	31.19	31.71	32.79	53.59
	4627799.80	33.86	31.05	33.37	32.76	53,56
324600.00	4626300.00	31.11	28,84	38.26	32.74	53,54
	4627-100.00	33.48	30.42	34.23	32.71	53.51
	4627500.00	32.27	32.54	33.30	32.70	53.50
325250,00	4626000.00	36.93	26.95	34,21	32.70	53.50
	4626900.00	33.01	29.19	35.79	32.66	53.46
	4627500.00	32.38	32.68	32.91	32.66	\$3.46
		31.88	30.51	35.52	32.63	\$3.43
323700.00	4626800.00	30.65	32.40	34.85	32,63	53.43
323300.00	4627500.00	32,09	32.34	33.38	32,60	53.40
		34.85	29,31	33.61	32.59	53.39
323500.00		32.77	29.34	35.58	32.56	53,36
325576.80	4628082.20	32.29	32,44	32.93	32.56	53,36
		32,50	32.29	32.85	32.55	53.3\$
324600,00	4628800.00	30.20	34.36	33.02	32.52	53.32
323100.00	4627200.00	33.62	28.22	35,62	32.49	53.29
		32.23	30.12	35,11	32.49	53.29
323200.00	4627300.00	34,04	27.48	35.89	32,47	53.27
323600.00	4626900.00	32,51	29.42	35.35	32,43	53.23 53.22
324900.00	4626800.00	28.44	32.13	36.69 35.09	32,42 32,41	53.21
323400.00		33,34	28,81 29,15	34.99	32.40	53,20
323900.00	4625250.00	33.07 31.10	31.48	34.62	32.40	53.20
325000,00 324000,00	-	29.30	36.69	31.21	32.40	53.20
324700.00	4626500.00	29.49	31.50	36,20	32.40	53.20
326107.30	4627352,00	31.86	29.57	35.76	32.40	53.20
324400.00	462B700.00	30,12	35.26	31.69	32,36	53.16
324405.40	4627236.80	30,36	31.16	35.38	32,30	53.10
324400.00		34.73	28,81	33.34	32.29	53,09
		32.26	33,26	31.30	32.27	53,07
324000.00	4627100.00	31.67	29.14	36.01	32.27	53.07
325400.00	4626800.00	3i.3i	32.57	32.88	32.25	53.05
324800.00	4626400.06	31.74	27.17	37.77	32.23	53.03
	4628900.00	29.91	33.34	33.43	32.23	53.03
325100.00	4626200.00	33.53	30.68	32,43	32.21	53.01
	4627000.00	32,73	28.60	35.14	32,15	52.95
	4628900.00	30.91	33.17	32.35	32,14	52.94
	4628800.00	30.75	33.68	31.96	32.13	52.93
	4624750.00	35.08	32.17	29.12	32.13	52.93
	4627500.00	32.39	31,63	32.36	32.12	52,92
325056.00		33.58	30.76	31.99 37.43	32.11	52,91 52,91
		27.65	31.25	37.45 35.51	32.11	52.89
	4627200.00 4627400.00	32.87	27.88 28.91	34,95	32.05	52.85
	-	33,58	30.35	32.22	32,05	52.85
		31,59	31.88	32.62	32.03	52.83
		34.60	28.18	33.16	31.98	52.78
324500.00		32,35	28.27	35.29	31.97	52.77
		32.63	28.25	35.03	31.97	52.77
		31.75	28,77	35.37	31.96	52,76
324166.40		32.01	30,45	33.39	31.95	52.75
324141.70	4627446.40	31.12	30,90	33.79	31.94	52,74
325400.00		32.55	29.17	34.08	31.93	52.73
325000.00	4626900.00	28.66	29.57	37.53	31.92	52.72
		32.77	2B.44	34.49	31.90	52.70
		31.25	29.96	34,48	35.90	52.70

Table D-4 Complative Analysis - 1-kr SO₂ Results

1.003 1/33	10001480	2008 Concentration	2009 Concentration	2016 Concentration ¹	1	3-yr Average ! Background
UTM(E)	UTM (N)	(ug/m³)	(ug/m³)	(ug/m ³)	3-yr Average (ug/m³)	(op/m)
(83)	(n)					
323900.00	4627100.00	31.68	28,33	35.69 32,38	31.89 31.89	52,69 52,69
325000.00 323100.00	4626100.00 4627100.00	33.08 33.17	30.22 28.78	33.63	31.86	52.66
326100.00	4627300,(K)	31.47	29.45	34.58	31.83	52.63
323800.00	4627(00,00	31.91	28.02	35.56	31.83	52.63
324200.00	4629100.00	33.10	31.33	31.06	31,83	52.63
325100.00	4626400.00	31,23	31.48	32.74	31.81	52.61
323300.00	4627300.00	33,51	26.62	35.31	31.81	52.61
324300.00	4627300.00	31.51	29,77	34.13	31.81	52,61
324300.00	4629000.00	31.09	33.46	30.86	31.80	\$2,60
	4627352.80	30.76	29,17	35.40	31.78	52.58
324100.00	4627400.00	31.66	30,63	32.91	31.73	52.53
324500,00	4626100.00	32.93	28.42	33,82	31.72	52.52
324500,00	4628600.00	29.30	34.98	30.82	31.70	52.50
323600.00	4627100.00	31.50	28.86	34.68	31.68	52.48
324986.70	4627800,50	32.56	30.76	31.70	31.67	52.47
	4628900.00	30,89	33.65	30.45	31.66	52.46
	4627400.00	32,99	27.21	34.74	31.65	52.45
323700.00	4627000.00	32,14	27.91	34.90	31.65	52.45
323200.00	4627100.00	32.57	28,69	33.59	31.62	\$2,42
325100.00	4626100.00	32.96	29,91	31.92	31.60	\$2,40
324600,00	4628600.00	29.62	34.41	30.75	31.60	52.40
324200,00	4629000.00	32.01	31.84	30.90	31.58	52.38
324500.00	4626300,00	30.35	29.81	34.53	31.56	52.36 52.34
	4627600,00	30.86	31.62	32.45	31.54	52.33
324600.00	4628900.00	30,65	32.86 28.41	31.09 34.55	31,53 31,53	52.33
323700.00 324266.80	4627100.00 4627339.70	31,61 31,20	29.00	34.30	31.50	52.30
323600.00	4627700.00	30.84	32,05	31.61	31.50	\$2,30
	4627500.00	32.33	29,99	32.16	31.49	\$2,39
	4626600.00	26.68	33.48	34.32	31.49	52.29
	4628700.00	29.92	34.89	29,65	31.49	52.29
	4627600.00	30.8%	31.49	32.09	31.48	52.28
	4631500,00	27.53	29.62	37.68	31.48	52.28
	4627300.00	33,02	26.64	34.75	31,47	52.27
	4627100.00	31,65	28.51	34.19	31.45	52.25
325079.50	4627871.90	32.51	30.36	31.46	31.44	52.24
325100.00	4626300.00	30.42	31.17	32.72	31.44	52.24
324200.00	4627260.00	31.34	29,68	33.27	31.43	\$2,23
323300,00	46272001.00	32.09	26.82	35.38	31.43	52.23
	46287681.00	29.28	35.14	29.86	31.42	52.22
323300.00	4627100.00	31.96	28.59	33.71	31.42	52.22
	4628900,00	28.80	33.39	32.06	31.42	52.22
_	4626800.00	28,08	29.91	36.19	31,39	52.19
	4628800.00	28,98	34.33	30.86	31,39	52.19
	4628200.00	30.38	33.99	29.80	31.39	52.19
	4627726.50	32,84	29.84	31.48	31.39	52.19 52.17
	4625500.00	33.45	28,69	31.96 34.15	31.37 31.35	52,17 52,15
	4627100.00	31.31 30.95	28,60	31.79	31.35	52.15
	4627660.00	30.95	31.30 31.10	30.65	31.32	52.12
	4626900.00 4627726,80	30.14	30.40	39.35	31.30	52.10
	4627465.70	30.86	29.03	34.00	31.30	52.10
	4628900.00	361.69	33.10	30.09	31.30	52.10
	4627340.50	31,22	28.61	34.04	31,29	52.09
	4627600.00	30.77	30.94	32.11	31,27	52.07
	4627485.00	31.05	28.61	34.10	31.25	\$2,05
	4629360.00	33,95	29.24	30.54	31.25	\$2,05
	4627300.00	32.63	26.76	34.34	31.24	52,04
	4629100.00	32.16	31,11	30.45	31.24	\$2,04
	4627100.00	31.36	28.53	33.80	31.23	52.03
			34.08	29.03	31.22	52.02

Geg/art Geg/	UTM(E)	UTM (N)	2008 Concentration	2009 Concentration ¹	2016 Concentration	3-yr Average	3-yr Average + Background
12424000 1 4629000 00							
1243f000 462370000 20 32.07 34.52 29.68 31.19 51.99 3238f0.09 462730010 32.00 22.50 33.86 31.19 51.99 3238f0.09 462730010 32.00 22.50 33.86 31.19 51.99 3238f0.09 462730010 32.00 22.50 33.86 31.19 51.99 3236f0.09 462730010 32.66 26.59 34.38 31.14 51.94 323700.19 462730010 32.66 26.59 34.38 31.14 51.94 3236f0.09 462730010 32.63 26.89 34.29 34.13 51.93 51.99 3236f0.09 462730010 32.63 26.89 34.29 34.13 51.93 51.99 3236f0.09 462730010 32.63 26.89 34.29 34.13 51.93 51.99 3236f0.09 462730010 32.63 36.89 34.29 34.13 51.93 51.90 3236f0.09 462730010 32.63 36.89 34.29 34.13 31.13 51.93 51.90 51.80 51.90 51.90 51.90 51.80 51.90 51.90 51.80 51.90 51.90 51.80 51.90 51.80 51.90 51.80 51.90 51.80 51.80 51.90 51.80 51.80 51.90 51.80 51.80 51.80 51.90 51.80 51.80 51.80 51.80 51.90 51.80			30,29	33.40	29.88	31.19	51.99
\$23500 to 4627400 to 32 to 22 50				34.52	29.68	31,19	51.99
1324000 00 4627400.00	323800.00	4627500.00	32.17	28.39			
1327B0.00 4627490.00 32.66 26.39 34.38 31.14 51.94 323600.00 4627390.01 32.23 26.89 34.29 34.13 51.93 323400.00 4627390.00 31.75 26.69 34.94 31.13 51.93 323400.00 4627900.00 31.75 26.69 34.94 31.13 51.93 323400.00 4627900.00 31.75 26.69 34.94 31.11 51.93 323400.00 4627900.00 31.75 26.69 34.94 31.11 51.93 323400.00 4627900.00 31.76 28.38 32.42 33.16 31.11 51.91 323600.00 4627900.00 29.86 28.32 35.16 31.11 51.91 323600.00 4627900.00 30.49 33.08 29.70 31.09 51.89 323600.00 4625900.00 30.49 33.08 29.70 31.09 51.89 324600.00 4625900.00 33.41 28.70 33.51 32.24 31.09 51.89 324700.00 4627900.00 33.41 28.70 30.87 31.16 31.08 51.88 324800.00 462900.00 33.41 28.70 30.87 31.05 51.86 324800.00 462800.00 33.41 28.70 30.87 31.06 51.86 324600.00 462800.00 33.41 28.70 30.87 31.06 51.86 324600.00 462800.00 33.41 28.70 30.83 31.01 51.81 324600.00 462800.00 33.41 28.70 30.83 31.01 51.81 324600.00 462800.00 33.41 32.80 30.83 31.01 51.81 324600.00 462800.00 33.90 34.36 30.58 31.01 51.81 325000.00 4627800.00 31.34 28.17 33.22 31.00 51.81 325000.00 4627800.00 31.34 28.17 33.25 31.29 31.01 51.81 325000.00 4627800.00 31.34 28.17 33.25 31.00 51.80 325000.00 4627800.00 31.34 28.37 33.29 31.99 51.77 324100.00 4627800.00 31.34 28.37 33.29 30.99 51.77 324100.00 4627800.00 31.34 28.31 33.30 30.99 51.77 324100.00 4627900.00 31.34 28.31 33.30 30.99 51.77 324100.00 4627900.00 31.34 28.31 33.31 33.30 30.99 51.77 324100.00 4627900.00 31.34 28.31 33.31 33.33 33.99 30.91 31.77 324100.00 4627900.00 31.48 32.42 33.43 33.33 33.99 30.99 31.77 324100.00 4627900.00 31.48 32.							
\$23200.00 \$4627300.00 \$3223 \$26.89 \$34.29 \$34.13 \$51.93 \$32400.00 \$4627200.00 \$31.75 \$26.69 \$34.94 \$31.13 \$51.93 \$32300.00 \$4627200.00 \$31.75 \$26.69 \$34.94 \$31.13 \$51.93 \$32300.00 \$4627200.00 \$33.74 \$29.16 \$30.47 \$31.12 \$51.93 \$32300.00 \$4627200.00 \$33.74 \$29.16 \$30.47 \$31.12 \$51.93 \$32500.00 \$4627200.00 \$33.74 \$29.16 \$30.47 \$31.11 \$51.91 \$32500.00 \$4627000.00 \$28.58 \$32.42 \$33.33 \$31.11 \$51.91 \$32500.00 \$462500.00 \$28.58 \$32.42 \$33.33 \$31.11 \$51.91 \$32500.00 \$462500.00 \$30.49 \$33.08 \$29.70 \$31.09 \$51.89 \$32500.00 \$462500.00 \$37.49 \$33.51 \$32.24 \$31.09 \$51.89 \$32200.00 \$462500.00 \$37.49 \$33.51 \$32.24 \$31.09 \$51.89 \$32200.00 \$462500.00 \$33.44 \$28.00 \$30.87 \$31.06 \$51.88 \$32200.00 \$462500.00 \$33.44 \$28.00 \$30.87 \$31.06 \$51.86 \$32200.00 \$462500.00 \$33.44 \$28.00 \$30.87 \$31.06 \$51.86 \$32200.00 \$462500.00 \$34.40 \$28.00 \$30.87 \$31.06 \$51.86 \$32500.00 \$462700.00 \$32.21 \$26.05 \$30.59 \$31.91 \$51.81 \$32500.00 \$462700.00 \$32.21 \$26.05 \$33.79 \$30.98 \$31.61 \$51.81 \$32500.00 \$462700.00 \$32.21 \$26.05 \$33.79 \$30.98 \$31.78 \$32500.00 \$462700.00 \$31.34 \$28.31 \$33.30 \$30.98 \$31.78 \$32500.00 \$462700.00 \$31.24 \$28.17 \$33.30 \$30.98 \$31.78 \$32500.00 \$462700.00 \$31.24 \$28.17 \$33.30 \$30.98 \$31.78 \$32500.00 \$462700.00 \$31.34 \$28.31 \$33.30 \$30.98 \$31.78 \$32500.00 \$462700.00 \$31.34 \$28.31 \$33.34 \$30.95 \$31.77 \$32500.00 \$462700.00 \$31.34 \$28.31 \$33.34 \$30.95 \$31.77 \$32500.00 \$462700.00 \$31.40 \$27.65 \$34.16 \$30.97 \$31.77 \$32500.00 \$462700.00 \$31.40 \$27.65 \$34.16 \$30.97 \$31.77 \$32500.00 \$462700.00 \$31.40 \$27.65 \$30.55 \$30.90 \$31.77 \$32500.00 \$462700.00 \$31.40 \$27.05 \$30.90 \$31.77 \$31.35 \$30.90 \$31.77 \$32500.00 \$462700.00 \$31.40 \$26.00 \$30.27							
124400_00 4627080_00 33.07 27.83 12.33 11.13 31.93 32340_00 4627280_00 31.75 26.69 34.94 31.13 51.93 32340_00 4627280_00 33.74 29.16 30.47 31.12 51.92 32380_00 4627980_00 33.74 29.16 30.47 31.12 51.92 32380_00 4627980_00 29.86 28.32 35.16 31.11 51.91 33.510.00 4627980_00 29.86 28.32 35.16 31.11 51.91 32400_00 46280_00 00 29.87 32.42 33.33 31.11 51.91 32400_00 46280_00 30.49 33.08 29.70 31.09 51.89 32500_00 46280_00 30.49 33.38 29.70 31.09 51.89 32500_00 46280_00 33.64 29.47 30.14 31.08 51.88 3240_00 34.20 30.85 29.71 30.14 31.08 51.88 3240_00 34.20 30.85 32.31 32.27 30.14 31.08 51.88 32.20 30.20 3							
323400.00 4627280.00 3175 26.69 31.94 31.11 51.93							
193300.00 465990.00 33.74 39.16 30.47 31.12 51.92							
132500.00 4627900.00 22,86 28,32 33,16 31,11 51,91							
325 00.00 4623 00.00 22.58 32.42 32.33 31.11 51.91							
324000.00 4625100.00 30.49 33.88 29.70 31.09 51.89 32500.00 462500.00 27.49 33.54 32.24 31.09 51.89 32500.00 462500.00 33.64 29.47 30.14 31.08 51.88 32420.00 462200.00 33.41 28.90 30.87 31.06 51.86 32420.00 462500.00 28.09 34.36 30.87 31.06 51.86 32420.00 462500.00 28.09 34.36 30.58 31.01 51.81 32500.00 462500.00 29.47 32.26 31.20 31.01 51.81 32500.00 462700.00 32.21 26.95 33.79 31.00 51.80 323500.00 462700.00 32.21 26.95 33.79 31.00 51.80 323500.00 462700.00 31.86 27.60 33.46 30.98 51.78 32300.00 462700.00 31.86 27.60 33.46 30.97 51.77 32400.00 4627500.00 31.86 27.60 33.46 30.97 51.77 32400.00 4627500.00 31.86 32.42 28.67 34.16 30.97 51.77 325400.00 4627500.00 32.42 28.67 34.16 30.97 51.77 325400.00 4627500.00 32.42 28.67 34.16 30.97 51.77 325400.00 4627500.00 32.42 28.67 34.81 30.96 51.76 324500.00 4627500.00 32.42 28.67 34.81 30.96 51.76 324500.00 4627500.00 32.42 38.67 34.81 30.96 51.76 324500.00 4627500.00 32.42 38.67 34.81 30.96 51.76 324500.00 4627500.00 32.42 38.97 38.97 51.77 325400.00 4627500.00 32.42 38.67 34.81 30.96 51.76 324500.00 4627500.00 32.44 38.67 34.81 30.96 51.76 324500.00 4627500.00 32.44 38.67 38.87 38.99 39.91 51.77 325400.00 4627500.00 32.44 38.67 38.87 38.99 39.91 51.77 325400.00 4627500.00 32.44 38.90 30.65 31.66 30.57 30.96 51.76 324500.00 4627500.00 32.47 30.90 30.65 31.66 30.57 30.99 51.77 324400.00 4627500.00 32.47 30.90 30.65 31.66 30.57 30.99 51.70 324500.00 4627500.00 32.47 30.90 30.65 31.66 30.57 30.90 51.70 324600.00 4627500.00 32.47 30.90 30.90 31.77 31.35 30.91 51.71 323760.00 4627700.00 32.47 30.90 30.90 31.77 31.35 30.91 51.71 323760.00 4627700.00 31.64 28.80 30.90 31.77 31.35 30.91 51.71 323760.00 4627700.00 31.64 28.80 30.90 31.77 31.35 30.91 51.71 323760.00 4627700.00 31.64 28.80 30.90 31.77 31.35 30.91 51.71 323760.00 462700.00 31.64 28.80 30.80 30.71 51.74 323760.00 462700.00 31.48 32.72 31.40 30.91 30.91 51.74 323760.00 462700.00 31.48 32.80 30.90 31.77 31.55 30.90 31.79 51.59 323760.00 462600.00 30.53 31.48 31.44 31.57 30.97 51.59 323760.00 462600.00 30.52 31.85 3							
\$\frac{\$25600.00}{\$25600.00}\$\$\frac{4625500.00}{\$3.640}\$\$\frac{27.49}{33.541}\$\$\frac{33.541}{32.244}\$\$\frac{31.09}{31.09}\$\$\frac{51.89}{31.818}\$\$\frac{321.2010.00}{31.2010.00}\$\$\frac{33.641}{30.2000}\$\$\frac{20.37.69}{33.441}\$\$\frac{20.200}{33.641}\$\$\frac{20.247}{30.141}\$\$\frac{31.09}{31.06}\$\$\frac{51.88}{31.06}\$\$\frac{51.88}{31.06}\$\$\frac{51.88}{31.06}\$\$\frac{51.88}{31.06}\$\$\frac{51.88}{31.06}\$\$\frac{51.88}{31.06}\$\$\frac{51.88}{31.06}\$\$\frac{51.88}{31.06}\$\$\frac{51.88}{31.06}\$\$\frac{51.88}{31.06}\$\$\frac{51.81}{31.34}\$\$\frac{32.26}{32.5900.00}\$\$\frac{4625500.00}{4625900.00}\$\$\frac{22.809}{29.447}\$\$\frac{34.26}{32.26}\$\$\frac{31.29}{31.01}\$\$\frac{31.01}{31.01}\$\$\frac{51.81}{51.81}\$\$\frac{32.2500.00}{32.21}\$\$\frac{62.2517}{20.29}\$\$\frac{33.22}{31.300}\$\$\frac{31.00}{32.21}\$\$\frac{51.80}{20.29}\$\$\frac{33.22}{31.300}\$\$\frac{30.27}{31.34}\$\$\frac{22.817}{28.31}\$\$\frac{33.30}{33.30}\$\$\frac{30.98}{30.98}\$\$\frac{51.78}{51.77}\$\$\frac{32.4200.00}{32.21}\$\$\frac{62.7500}{62.2500.00}\$\$\frac{31.34}{31.60}\$\$\frac{27.60}{27.65}\$\$\frac{31.6}{31.60}\$\$\frac{30.97}{31.60}\$\$\frac{51.77}{32.4500.00}\$\$\frac{462.2500.00}{462.2500.00}\$\$\frac{31.80}{31.60}\$\$\frac{27.60}{27.65}\$\$\frac{31.60}{31.60}\$\$\frac{30.97}{31.60}\$\$\frac{51.77}{32.4500.00}\$\$\frac{462.2500.00}{462.2500.00}\$\$\frac{32.42}{28.67}\$\$\frac{31.81}{31.81}\$\$\frac{30.97}{30.99}\$\$\frac{51.77}{31.77}\$\$\frac{32.4500.00}{32.42}\$\$\frac{462.2500.00}{32.42}\$\$\frac{32.400.00}{30.65}\$\$\frac{31.66}{30.57}\$\$\frac{30.57}{30.35}\$\$\frac{30.99}{30.99}\$\$\frac{51.76}{31.77}\$\$\frac{32.500.00}{32.400.00}\$\$\frac{462.2500.00}{462.2500.00}\$\$\frac{32.42}{29.59}\$\$\frac{30.57}{30.35}\$\$\frac{30.99}{30.99}\$\$\frac{51.71}{31.73}\$\$\frac{30.99}{30.99}\$\$\frac{51.71}{31.73}\$\$\frac{30.99}{30.99}\$\$\frac{51.71}{31.73}\$\$\frac{30.99}{30.99}\$\$\frac{51.71}{31.73}\$\$\frac{30.99}{30.99}\$\$\frac{51.71}{31.79}\$\$\frac{32.2500.00}{32.42}\$\$\frac{29.60}{30.35}\$\$\frac{30.90}{30.57}\$\$\frac{51.72}{30.35}\$\$\frac{30.90}{30.99}\$\$\frac{51.70}{31.79}\$\$\frac{30.90}{31.79}\$\$\frac{51.79}{31.79}\$\$\frac{30.90}{30.99}\$\$\frac{51.79}{31.79}\$\$\fr	<u> </u>						
324100.03 4629300.00 33.44 22.97 30.14 31.08 51.88 124200.03 33.44 22.90 30.87 31.06 51.86 51.86 63.42222 04.02716.76 30.85 23.31 32.97 31.04 51.86 13.4222 04.02716.76 30.85 23.31 32.97 31.04 51.86 13.4222 04.02716.76 30.85 23.31 32.97 31.04 51.86 13.4222 04.02716.76 30.85 23.31 32.97 31.04 51.81 13.4200.00 462800.00 29.47 32.26 31.22 31.01 51.81 13.25000.00 462700.00 31.62 28.17 33.22 31.00 51.80 33.3500.00 462700.00 32.21 26.95 33.79 30.93 51.78 33.2400.00 462700.00 32.21 26.95 33.79 30.93 51.78 33.2400.00 462700.00 31.36 22.16 26.95 33.79 30.93 51.78 33.2400.00 4627500.00 31.36 22.60 33.46 30.97 51.77 32.4100.00 4627500.00 31.36 22.60 33.46 30.97 51.77 32.4100.00 4627500.00 31.36 32.42 32.30 32.30 30.99 51.78 32.400.00 4628500.00 28.81 33.84 30.39 30.97 51.77 32.4500.00 4628500.00 28.81 33.84 30.39 30.97 51.77 32.4500.00 4628500.00 32.42 28.67 31.81 30.96 51.76 33.2530.00 4628500.00 32.42 28.67 31.81 30.96 51.76 33.2530.00 4628500.00 32.42 28.67 31.81 30.96 51.76 33.2530.00 4628500.00 32.42 29.55 30.35 33.20 30.93 51.73 32.4500.00 4628500.00 32.42 29.55 30.35 33.20 30.93 51.73 32.4500.00 4628500.00 32.42 32.59 30.51 33.30 30.99 51.70 32.4500.00 462800.00 32.42 32.59 30.51 30.30 30.91 51.71 32.4500.00 462800.00 32.42 32.59 30.35 32.00 30.91 51.70 32.4500.00 462800.00 32.42 32.59 30.31 30.90 51.70 32.4500.00 462800.00 32.42 32.59 30.31 30.90 51.70 32.4500.00 462800.00 32.42 32.59 30.31 31.24 31.37 30.91 51.71 32.4500.00 462700.00 31.29 36.00 31.30 31.24 31.37 30.91 51.71 32.4500.00 462700.00 31.29 36.00 31.30 31.24 31.37 30.91 51.71 32.4500.00 462700.00 31.64 26.66 34.20 30.90 51.70 32.4400.00 462700.00 31.29 36.60 31.30 31.24 31.37 30.91 51.71 32.4400.00 462800.00 31.29 30.90 31.44 30.51 30.88 51.68 32.4400.00 462800.00 31.29 30.90 31.44 30.51 30.88 51.68 32.4400.00 462800.00 31.29 30.90 31.64 30.35 30.88 51.68 32.4400.00 462800.00 31.29 30.90 31.44 30.51 30.88 51.68 32.4400.00 462800.00 30.27 31.49 33.50 30.00 30.90 31.49 31.49 33.50 30.90 30.90 31.49 31.49 33.49 33.49 30.97 51.59 32.4400.00 462800.00 30.27							
1324201.00 4629300.00 33.44 28.90 30.87 31.06 51.86 32422.20 4627369.60 30.85 29.31 32.97 31.04 51.81 32500.00 4628500.00 28.09 34.36 30.58 34.01 51.81 32500.00 4628500.00 29.47 32.26 31.20 31.00 51.80 32300.00 462700.00 31.67 28.17 33.22 31.00 51.80 32300.00 462700.00 32.21 26.95 33.79 30.98 51.78 32420.00 4627200.00 31.34 28.31 33.30 30.98 51.78 32420.00 4627300.00 31.86 27.60 33.46 30.97 51.77 324100.00 4627300.00 31.80 27.65 34.16 30.97 51.77 324300.00 462800.00 31.80 27.65 34.16 30.97 51.77 324300.00 462800.00 32.42 28.67 31.81 30.96 51.76 325300.00 462800.00 32.42 28.67 31.81 30.96 51.76 325300.00 462800.00 32.42 28.57 31.81 30.96 51.76 325300.00 462800.00 32.42 28.57 31.81 30.96 51.76 324500.00 462800.00 32.42 28.57 31.81 30.96 51.76 324500.00 462800.00 32.42 28.57 31.81 30.96 51.76 324500.00 462800.00 32.42 29.53 30.30 30.93 51.73 324600.00 462800.00 32.42 29.53 30.30 30.93 51.73 324600.00 4627700.00 32.42 29.53 30.30 30.93 51.73 324600.00 4627700.00 32.42 39.50 30.91 30.17 323700.00 4627700.00 32.42 39.50 30.91 30.17 323700.00 462700.00 32.42 39.50 30.91 30.17 323700.00 462700.00 32.42 30.90 31.77 323700.00 462700.00 32.43 30.90 31.77 323700.00 462700.00 31.64 20.66 34.20 30.90 51.70 324700.00 462700.00 31.64 20.66 34.20 30.90 51.70 324700.00 462700.00 31.64 20.66 34.20 30.90 51.70 324700.00 462700.00 30.55 31.64 30.55 30.51 30.88 51.68 324700.00 462700.00 30.55 31.64 30.55 30.55 30.85 51.65 324700.00 462800.00 30.55 31.64 30.55 30.65 30.81 31.65 324700.00 462800.00 30.52 30.55 31.65 32.48 324700.00 462800.00 30.55 31							
324202.20 4627160.00 30.85 29.31 32.97 31.04 51.81				28,90	30.87	31.06	51.86
33400.00 462800.00 28.09 34.36 30.58 31.01 51.81					32.97	31.04	
323900.00 4627400.00 31,62 28,17 33,22 31,00 51,80 323500.00 462700.00 32,21 26,95 33,79 30,98 51,78 32300.00 462700.00 31,34 28,31 33,30 30,98 51,78 32300.00 4627500.00 31,86 27,60 33,46 30,97 51,77 324100.00 4627500.00 31,10 27,65 34,16 30,97 51,77 325400.00 4627500.00 32,42 28,67 31,81 30,96 51,76 325500.00 4628500.00 32,42 28,67 31,81 30,96 51,76 325500.00 4628500.00 32,42 28,67 31,81 30,96 51,76 325500.00 4628500.00 30,65 31,66 30,57 30,96 51,76 325500.00 4628500.00 32,42 29,53 30,80 30,97 31,73 32400.00 4629500.00 32,42 29,53 30,80 30,93 51,73 32400.00 4629500.00 32,42 29,53 30,80 30,93 51,73 32400.00 4627702.00 32,42 29,53 30,80 30,93 51,73 32400.00 4627702.00 32,42 30,93 31,77 30,92 51,72 32400.00 4627702.00 32,42 30,93 31,77 30,92 51,72 32400.00 4627702.00 32,40 30,91 31,77 30,92 51,72 32400.00 4627702.00 32,60 31,77 31,35 30,91 51,71 323700.00 4627702.00 32,60 31,77 31,35 30,91 51,71 323700.00 4627702.00 32,60 31,77 31,35 30,91 51,71 323700.00 462700.00 31,64 26,66 34,20 30,90 51,70 32400.00 4627100.00 31,29 30,81 30,81 30,54 30,88 51,68 324700.00 462800.00 31,29 30,81 30,81 30,54 30,88 51,68 324700.00 462800.00 28,52 34,06 29,92 30,83 51,63 324500.00 462800.00 28,52 34,06 29,92 30,83 51,63 324500.00 462800.00 28,52 34,06 29,92 30,83 51,65 324500.00 4628700.00 28,52 34,06 29,92 30,83 51,65 324500.00 4628700.00 28,52 34,06 29,92 30,83 51,65 324500.00 4628700.00 28,52 34,06 29,92 30,83 51,65 324500.00 4628700.00 28,52 34,06 29,92 30,83 51,65 324500.00 4628700.00 28,52 34,06 29,92 30,83 51,65 324500.00 4628700.00 28,52 34,06 29,92 30,83 51,65 324500.00 4628700.00 28,52 34,06 29,92 30,83 51,65 324500.00 4628700.00 28,52 34,06 29,92 30,83 51,65 324500.00 4628700.00 28,52 34,06 29,92 30,83 51,65 324500.00 4628700.00 28,52 34,06 29,92 30,83 51,65 324500.00 4628700.00 28,52 34,06 29,92 30,83 51,65 324500.00 4628700.00 28,52 34,06 29,92 30,83 51,65 324500.00 4628700.00 30,22 34,06 32,93 30,93 30,93 31,51,53 32,50 30,00 30,93 31,51,51 32,50 30,00 30,76 31,55 32,50 30,00 30,77 31,59 31,50 30,77 31,51,51 32,50 30			28.09	34.36			
323500.00 4627200.00 32.21 26.95 33.79 30.98 51.78 324200.00 4627300.00 31.34 28.31 33.30 30.98 51.78 323900.00 4627500.00 31.86 27.60 33.46 30.97 51.77 324100.00 4627500.00 31.10 27.65 34.16 30.97 51.77 324500.00 462500.00 28.18 33.84 30.89 30.97 51.77 324500.00 4626500.00 32.42 28.67 31.81 30.96 51.76 32530.00 462600.00 32.42 28.67 31.81 30.96 51.76 32530.00 462620.00 32.42 28.67 31.81 30.96 51.76 32530.00 462620.00 32.42 29.53 30.35 35.20 30.93 51.73 324500.00 462520.00 27.25 30.35 35.20 30.93 51.73 324500.00 462520.00 32.42 29.58 30.90 30.93 51.73 324607.00 462720.60 32.39 30.01 30.17 30.92 51.72 324607.00 462720.00 39.00 31.44 31.37 30.91 51.71 323700.00 462700.00 39.00 31.64 31.24 31.37 30.91 51.71 323700.00 462700.00 39.00 31.64 26.86 34.20 30.90 51.70 324500.00 462700.00 39.00 31.64 30.86 34.20 30.90 51.70 324400.00 462700.00 31.64 26.86 34.20 30.90 51.70 324400.00 462900.00 31.64 36.86 30.31 31.24 31.37 30.91 51.71 323700.00 462700.00 39.00 31.64 36.86 34.20 30.90 51.70 324400.00 462900.00 31.64 36.86 30.31 30.94 30.93 30.90 51.70 324400.00 462900.00 31.64 30.88 30.94 30.93 51.70 324400.00 462900.00 31.64 30.86 30.90 51.70 324400.00 462900.00 31.64 30.85 30.94 30.93 51.70 324400.00 462900.00 31.64 30.86 30.94 30.93 51.70 324400.00 462900.00 31.64 30.95 31.64 30.95 30.90 51.70 324400.00 462900.00 31.94 30.95 30.90 51.70 324400.00 462900.00 31.94 30.95 30.95 30.90 51.70 324400.00 462900.00 31.94 30.95 30.95 30.95 30.95 30.95 30.95 30.95 324900.00 462900.00 30.92 30.90 30.90 30.90 51.70 324900.00 462800.00 30.92 30.90 30.90 30.90 51.70 324900.00 462800.00 30.93 30.93 30.93 30.93 30.95 30						-	
324200.00							
323900.00 4627500.00 31.86 27.60 33.46 30.97 51.77 324100.00 4627500.00 31.10 27.65 34.16 30.97 51.77 324500.00 4628500.00 28.18 33.84 30.89 30.97 51.77 325400.00 4628500.00 32.42 28.67 31.81 30.96 51.76 332530.00 4626702.00 30.65 31.66 30.57 30.96 51.76 324500.00 4625250.00 27.25 30.35 35.20 30.93 51.73 324500.00 462900.00 32.42 29.58 30.30 30.93 51.73 324607.00 462726.20 32.59 30.01 30.17 30.92 51.72 324607.00 4627726.20 32.59 30.01 30.17 30.92 51.72 324106.70 462700.00 30.65 31.44 31.37 30.91 51.71 323700.00 462700.00 31.64 26.86 34.20 30.90 51.70 324607.00 4627300.00 31.64 26.86 34.20 30.90 51.70 324400.00 462700.00 31.64 26.86 34.20 30.90 51.70 324400.00 462900.00 31.29 30.81 30.54 30.89 51.78 324400.00 4629100.00 31.29 30.81 30.54 30.88 51.68 334500.00 4628700.00 28.39 33.78 30.51 30.88 51.68 334500.00 4628700.00 28.52 34.06 29.92 30.83 51.65 324800.00 4628700.00 30.55 31.64 30.35 30.85 51.66 324800.00 4628700.00 30.55 31.64 30.35 30.85 51.65 324800.00 4628700.00 30.55 31.64 30.35 30.85 51.65 324800.00 4628700.00 30.55 31.64 30.35 30.85 51.66 324800.00 4628700.00 30.55 31.64 30.35 30.85 51.66 324800.00 4628700.00 30.55 31.64 30.35 30.85 51.65 324800.00 4628700.00 30.55 31.64 30.35 30.85 51.65 324800.00 4628700.00 30.55 31.64 30.35 30.85 51.65 324800.00 4628700.00 30.55 31.64 30.35 30.85 51.66 324800.00 4628700.00 30.55 31.64 30.35 30.85 51.65 324800.00 4628700.00 30.55 31.64 30.35 30.85 51.65 324800.00 462800.00 30.55 31.64 30.35 30.85 51.65 324800.00 462800.00 30.55 31.64 30.35 30.85 51.65 324800.00 462800.00 30.55 31.64 30.35 30.85 51.65 324800.00 462800.00 30.55 31.64 30.35 30.85 51.65 324800.00 462800.00 30.55 31.69 30.50 30.81 51.66 324800.00 462800.00 30.55 31.69 30.50 30.50 30.81 51.65 324800.00 462800.00 30.55 31.69 30.50 30.50 30.81 51.65 324800.00 462800.00 30.55 31.69 30.50 30.50 30.81 51.65 324800.00 462800.00 30.55 31.69 30.50 30.50 30.81 51.65 324900.00 462800.00 30.57 31.99 30.12 30.79 51.59 324900.00 462800.00 30.57 31.99 30.12 30.79 51.59 324900.00 462800.00 30.57 31.99 30.12 30.79 51.59							
\$\frac{124100.00}{224500.00} \$4527500.00 \$31.10 \$27.65 \$34.16 \$30.97 \$51.77 \$234500.00 \$4528500.00 \$28.18 \$33.84 \$30.39 \$30.97 \$51.77 \$325400.00 \$4628500.00 \$32.42 \$28.67 \$31.81 \$30.96 \$51.76 \$325200.00 \$4625250.00 \$32.42 \$28.67 \$31.81 \$30.96 \$51.76 \$32500.00 \$4625250.00 \$27.25 \$30.35 \$35.20 \$30.93 \$51.73 \$324500.00 \$4625250.00 \$27.25 \$30.35 \$35.20 \$30.93 \$51.73 \$324500.00 \$4625250.00 \$27.25 \$30.35 \$35.20 \$30.93 \$51.73 \$324607.00 \$4627726.20 \$32.59 \$30.01 \$30.17 \$30.92 \$51.72 \$324607.00 \$4627726.20 \$32.59 \$30.01 \$30.17 \$30.92 \$51.72 \$324607.00 \$4627760.00 \$29.60 \$31.77 \$31.35 \$30.91 \$51.71 \$327602.00 \$462760.00 \$29.60 \$31.77 \$31.35 \$30.91 \$51.71 \$327602.00 \$462760.00 \$29.60 \$31.77 \$31.35 \$30.91 \$51.71 \$327602.00 \$4627353.70 \$29.65 \$28.09 \$34.96 \$30.90 \$51.70 \$324000.00 \$4629100.00 \$31.29 \$30.81 \$30.34 \$30.88 \$51.68 \$324700.00 \$4628700.00 \$28.52 \$34.06 \$29.92 \$34.96 \$30.80 \$51.60 \$324900.00 \$4628700.00 \$28.52 \$34.06 \$29.92 \$30.85 \$51.65 \$324800.00 \$4628700.00 \$28.52 \$34.06 \$29.92 \$30.85 \$51.65 \$324800.00 \$4628700.00 \$28.52 \$34.06 \$29.92 \$33.66 \$30.81 \$51.61 \$324900.00 \$4627700.00 \$28.52 \$34.06 \$29.92 \$33.66 \$30.81 \$51.61 \$324900.00 \$4627700.00 \$28.52 \$34.06 \$29.92 \$33.66 \$30.81 \$51.61 \$324900.00 \$4627700.00 \$28.52 \$34.06 \$29.92 \$33.66 \$30.81 \$51.65 \$324900.00 \$4627700.00 \$28.52 \$34.06 \$29.92 \$33.66 \$30.81 \$51.65 \$324900.00 \$462700.00 \$30.52 \$29.76 \$32.48 \$30.82 \$51.65 \$324900.00 \$462700.00 \$30.52 \$30.79 \$51.59 \$324900.00 \$462700.00 \$30.52 \$30.79 \$51.59 \$324900.00 \$462700.00 \$30.54 \$30.79 \$51.59 \$324900.00 \$462600.00 \$30.54 \$30.79 \$51.59 \$324900.00 \$462600.00 \$30.54 \$30.76 \$51.55 \$32500.00 \$462600.00 \$30.54 \$30.76 \$51.55 \$32							
324500.00 4628500.00 28.18 33.84 30.89 30.97 51.77 325400.00 4626700.00 32.42 28.67 31.81 30.96 51.76 325230.00 4628028.00 30.65 31.66 30.57 30.96 51.76 324500.00 4625250.00 27.25 30.35 35.20 30.93 51.73 324300.00 4627276.20 32.39 30.01 30.17 30.92 51.72 324406.70 4627726.20 32.39 30.01 30.17 30.91 51.71 123700.00 4627736.60 30.13 31.24 31.37 30.91 51.71 123700.00 4627730.00 29.60 31.77 31.35 30.91 51.71 123700.00 4627353.70 29.65 28.09 34.96 30.90 51.70 324400.00 4627300.00 31.54 26.86 34.20 30.90 51.70 324400.00 4627300.00 31.29 30.81 30.51 30.81 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>							
325400.00 4625700.00 32.42 28.67 31.81 30.96 \$1.76 32520.00 462820.00 30.65 31.66 30.57 30.96 \$51.76 324500.00 4625250.00 27.25 30.35 35.20 30.93 \$1.73 324607.00 4625250.00 32.42 29.55 30.35 35.20 30.93 \$1.73 324607.00 462726.20 32.59 30.01 30.17 30.92 \$1.72 324607.00 4627768.60 30.13 31.24 31.37 30.91 \$1.71 323700.00 4627700.00 29.60 31.47 31.35 30.91 \$1.71 323700.00 4627300.00 31.64 26.86 34.20 30.90 \$1.70 326206.20 4627353.70 29.65 28.09 34.96 30.90 \$1.70 324700.00 4627100.00 31.59 30.81 30.54 30.88 \$1.68 324700.00 4628700.00 28.39 33.74 30.51 30.88 \$1.68 324700.00 4628700.00 30.55 31.64 30.35 30.81 30.88 \$1.68 324800.00 4628700.00 28.39 33.74 30.51 30.88 \$1.68 324800.00 4628700.00 28.39 33.74 30.51 30.85 \$1.65 324800.00 4628700.00 28.39 33.74 30.51 30.85 \$1.65 324800.00 4628700.00 28.39 33.74 30.51 30.85 \$1.65 324800.00 4628700.00 28.39 33.74 30.51 30.85 \$1.65 324800.00 4628700.00 30.25 31.64 30.35 30.85 \$1.65 324800.00 4628700.00 28.39 33.79 33.50 30.05 30.83 \$1.63 324900.00 4628700.00 28.39 30.25 31.64 30.35 30.85 \$1.65 324800.00 4628700.00 28.39 33.50 30.05 30.83 \$1.63 324900.00 4628700.00 28.39 30.22 29.76 32.48 30.82 \$1.65 324800.00 4628700.00 30.22 30.81 31.64 30.35 30.85 \$1.65 324800.00 4628700.00 30.22 30.81 31.64 30.35 30.85 \$1.65 324800.00 4628700.00 30.22 30.81 31.65 324900.00 4628700.00 30.35 31.48 27.29 33.66 30.81 \$1.61 323800.00 4628700.00 30.22 30.81 31.42 31.15 30.79 \$1.59 324900.00 4628700.00 30.32 32.38 27.43 35.11 30.78 \$1.58 324900.00 462800.00 30.32 32.38 29.61 30.77 \$1.57 325200.00 462600.00 30.34 31.17 29.46 31.11 30.78 \$1.58 325200.00 462600.00 30.35 32.38 29.61 30.77 \$1.57 325200.00 462600.00 30.36 27.73 33.59 30.08 30.71 \$1.54 325200.00 462600.00 30.36 27.73 33.59 30.08 30.71 \$1.54							
\$\frac{325230,00}{324500,00} \text{4628250,00}{4625250,00} \text{2725}{230,35} \qu							
324500.00 4625250.00 27.25 30.35 35.20 30.93 51.73 324300.00 4625200.00 32.42 29.58 30.80 30.93 51.73 324607.00 4627726.20 32.59 30.01 30.17 30.92 51.72 324106.70 4627736.80 30.13 31.24 31.37 30.91 51.71 323700.00 4627700.00 29.60 34.77 31.35 30.91 51.74 323700.00 4627300.00 31.64 26.86 34.20 30.90 51.70 326206.20 462733.3 29.65 28.09 34.96 30.90 51.70 324400.00 462910.00 31.29 30.81 30.54 30.88 51.68 324700.00 462800.00 28.39 33.74 30.51 30.88 51.68 324800.00 462910.00 30.55 31.64 30.35 30.85 51.65 324800.00 4628700.00 28.52 34.06 29.92 30.83 51.63 324900.00 4628700.00 28.73 33.50 30.05 30.83 51.63 324900.00 4628700.00 28.73 33.50 30.05 30.83 51.63 324900.00 4628700.00 28.91 33.48 27.29 33.66 30.81 51.61 324800.00 4628700.00 29.81 31.42 31.15 30.79 51.59 324900.00 4629700.00 30.27 31.99 30.12 30.79 51.59 324900.00 4629700.00 30.32 31.34 31.37 30.78 51.58 324900.00 4629700.00 30.32 31.39 30.32 30.79 51.59 324900.00 4629700.00 30.32 31.39 30.32 30.79 51.59 324900.00 4629000.00 30.32 31.39 30.32 30.79 51.59 324900.00 4629000.00 30.32 31.39 30.32 30.79 51.59 324900.00 4629000.00 30.32 32.38 29.61 30.77 51.57 325900.00 462600.00 33.34 26.85 31.89 30.76 51.56 32500.00 462600.00 33.34 26.85 31.89 30.76 51.56 32500.00 462600.00 32.85 27.28 32.13 30.76 51.56 32500.00 462600.00 32.85 27.28 32.13 30.76 51.52 32500.00 462600.00 33.36 26.85 31.89 30.72 51.52 32500.00 462600.00 33.30 28.95 29.91 30.72 51.52 32500.00 462600.00 33.30 28.95 29.91 30.72 51.52 32500.00 462600.00 33.30 28.95 29.91 30.77 51.57 32500.00 462600.00 33.30 28.95 29.91							
324300.00 4629200.00 32.42 29.58 30.80 30.93 51.73 324607.00 4627726.20 32.59 30.01 30.17 30.92 51.72 324106.70 462730.00 30.33 31.24 31.37 30.91 51.74 323700.00 4627700.00 29.60 31.77 31.35 30.91 51.74 323700.00 462730.00 31.64 26.86 34.20 30.90 51.70 326206.20 4627353.70 29.65 28.09 34.96 30.90 51.70 324400.00 4622100.00 31.29 30.81 30.54 30.83 51.68 324700.00 4622100.00 28.39 33.74 30.51 30.88 51.68 324500.00 4629100.00 30.55 31.64 30.35 30.85 51.65 324800.00 4628700.00 28.52 34.06 29.92 30.83 51.63 324900.00 4628700.00 28.93 33.50 30.05 30.83 51.63 324900.00 4628700.00 30.22 29.76 32.48 30.32 51.62 324900.00 462700.00 31.48 27.29 33.66 30.81 51.61 3238081.00 462700.00 29.81 31.42 31.15 30.79 51.59 32490.00 462700.00 30.27 31.99 30.12 30.79 51.59 32490.00 462700.00 30.27 31.99 30.12 30.79 51.59 32490.00 462700.00 30.37 33.50 33.37 33.51 30.78 51.58 32500.00 462700.00 30.37 33.50 33.37 33.11 30.78 51.58 32500.00 462700.00 30.37 33.39 33.50 30.77 51.59 32490.00 462700.00 30.37 33.39 33.50 30.77 51.59 32490.00 462700.00 30.37 33.39 33.30 33.70 30.77 51.59 32490.00 462700.00 30.37 33.39 30.76 51.56 32500.00 462600.00 30.37 33.34 30.76 51.56 32500.00 462600.00 33.34 26.85 33.89 30.72 51.52 32500.00 462600.00 33.34 26.85 33.89 30.72 51.52 32500.00 462600.00 33.35 25.36 34.49 30.72 51.52 32500.00 462600.00 33.30 28.95 29.91 30.72 51.52 32500.00 462600.00 33.30 28.95 29.91 30.72 51.52 32500.00 462600.00 33.30 28.95 29.91 30.72 51.52 32500.00 462600.00 33.30 28.95 29.91 30.72 51.52 32500.00 462600.00 33.30 28.95 29.91 30.72 51.52 32500.00 462600.00 33.30 28.95 29.91 30.75 51.							
324607.00 4627726.20 32.59 30.01 30.17 30.92 51.72 324106.70 4627638.60 30.13 31.24 31.37 30.91 51.71 323700.00 4627700.00 29.60 31.77 31.35 30.91 51.71 323700.00 4627300.00 31.64 26.86 34.20 30.90 51.70 324700.00 4627300.00 31.64 26.86 34.20 30.90 51.70 324400.00 4627300.00 31.29 30.81 30.54 30.88 51.68 324700.00 462800.00 28.39 33.74 30.51 30.88 51.68 324700.00 462800.00 28.39 33.74 30.51 30.88 51.65 324800.00 4629700.00 28.32 34.06 29.92 30.83 51.63 324800.00 4628700.00 28.93 33.50 30.05 30.83 51.63 324900.00 4628700.00 28.93 33.50 30.05 30.83 51.63 324900.00 4628700.00 30.22 29.76 32.48 30.82 51.62 324800.00 462700.00 30.22 29.76 32.48 30.82 51.62 323800.00 462700.00 29.81 31.42 31.15 30.79 51.59 32490.00 462700.00 29.81 31.42 31.15 30.79 51.59 32490.00 462700.00 30.27 31.99 30.12 30.79 51.59 32490.00 462700.00 30.27 31.99 30.12 30.78 51.58 325900.00 462700.00 33.54 26.85 31.89 30.76 51.56 325900.00 4626800.00 33.54 26.85 31.89 30.76 51.56 325200.00 462600.00 33.54 26.85 31.89 30.76 51.56 325200.00 462600.00 33.54 26.85 31.89 30.76 51.56 325200.00 462600.00 30.76 27.73 33.74 30.72 51.52 325200.00 462600.00 30.76 27.73 33.79 30.72 51.52 325200.00 462600.00 30.76 27.73 33.79 30.72 51.52 325200.00 462600.00 30.30 27.90 31.69 32.88 30.72 51.52 325200.00 462600.00 30.31 25.36 34.49 30.72 51.52 325200.00 462600.00 30.31 25.36 34.49 30.72 51.52 325200.00 462600.00 30.31 25.36 34.49 30.72 51.52 325200.00 462600.00 30.31 25.36 34.49 30.72 51.52 325300.00 462600.00 33.30 28.95 29.91 30.72 51.51 325300.00 462600.00 30.31 25.36 34.49							
324106.70 4627638.60 30.13 31.24 31.37 30.91 51.71 323700.00 4627700.00 29.60 31.77 31.35 30.91 51.71 323700.00 4627300.00 31.64 26.86 34.20 30.90 51.70 326206.20 4627353.70 29.65 28.09 34.96 30.90 51.70 324400.00 4629100.00 31.29 30.81 30.54 30.88 51.68 324700.00 462800.00 28.39 33.74 30.51 30.88 51.68 324500.00 4629100.00 30.35 31.64 30.35 30.85 51.65 324800.00 4628700.00 28.52 34.06 29.92 30.83 51.63 324900.00 4628700.00 28.73 33.50 30.05 30.83 51.63 324900.00 4628700.00 28.73 33.50 30.05 30.83 51.63 324900.00 4628700.00 30.22 29.76 32.48 30.82 51.62 324900.00 4627500.00 30.21 31.48 27.29 33.66 30.81 51.61 323801.00 4627700.00 29.81 31.42 31.15 30.79 51.59 324900.00 462700.00 30.27 31.99 30.12 30.79 51.59 324900.00 462700.00 30.27 31.99 30.12 30.79 51.59 324900.00 462700.00 30.27 31.99 30.12 30.79 51.58 325900.00 462700.00 29.80 27.43 35.11 30.78 51.58 325900.00 462600.00 30.34 32.38 29.61 30.77 51.57 325200.00 462600.00 30.34 32.38 29.61 30.77 51.57 325200.00 462600.00 30.34 26.85 31.89 30.76 51.56 325200.00 462600.00 30.34 25.36 34.49 30.72 51.52 324900.00 462600.00 30.33 25.36 34.49 30.72 51.52 324900.00 462600.00 30.33 25.36 34.49 30.72 51.52 324900.00 462600.00 30.30 28.47 33.59 30.08 30.71 51.51 324900.00 462800.00 30.30 28.47 33.59 30.08 30.71 51.51 324900.00 462800.00 30.30 28.47 33.59 30.08 30.71 51.51 324900.00 462800.00 30.30 28.47 33.59 30.08 30.71 51.51 324900.00 462800.00 30.30 28.47 33.59 30.08 30.71 51.51 324900.00 462800.00 30.30 28.47 33.59 30.08 30.71 51.51 324900.00 462800.00 30.30 28.47 33.59 30.08 30.71							
\$\frac{123790.00}{323790.00}			·				
326206.20 4627353.70 29.65 28.09 34.96 30.90 51.70 324400.00 4629100.00 31.29 30.81 30.54 30.88 \$1.68 324700.00 4628600.00 28.39 33.74 30.51 30.88 \$1.68 324500.00 4628700.00 30.55 31.64 30.35 30.85 \$1.65 324800.00 4628700.00 28.52 34.06 29.92 30.83 \$1.63 324900.00 4628700.00 28.93 33.50 30.05 30.83 \$1.63 324900.00 4628700.00 28.93 33.50 30.05 30.83 \$1.63 324900.00 4628700.00 30.22 29.76 32.48 30.82 \$1.62 32400.00 462700.00 31.48 27.29 33.66 30.81 \$1.51 323860.00 462700.00 39.81 31.42 31.15 30.79 \$1.59 324900.00 462900.00 30.27 31.99 30.12 30.79			29.60	31.77	31.35	30,91	
324400.00 4629100.00 31.29 30.81 30.54 30.88 \$1.68 324700.00 4628600.00 28.39 33.74 30.51 30.88 \$1.68 324800.00 4629100.00 30.55 31.64 30.35 30.85 \$1.65 324800.00 4628700.00 28.52 34.06 29.92 30.83 \$1.63 324900.00 4628700.00 28.93 33.50 30.05 30.83 \$1.63 324100.00 4628700.00 30.22 29.76 32.48 30.82 \$1.62 324000.00 4627300.00 30.22 29.76 32.48 30.82 \$1.62 324000.00 4627300.00 31.48 27.29 33.66 30.81 \$1.51 324900.00 4627300.00 30.27 31.99 30.12 30.79 \$1.59 324900.00 462700.00 30.27 31.99 30.12 30.79 \$1.58 325900.00 462700.00 30.32 32.38 29.41 30.78			31.64	26.86		30.90	
324700.00 4628600.00 28.39 33.74 30.51 30.88 \$1.68 324500.00 4629100.00 30.55 31.64 30.35 30.85 \$1.65 324800.00 4628700.00 28.52 34.06 29.92 30.83 \$1.63 324900.00 4628700.00 28.93 33.50 30.05 30.83 \$1.63 324100.00 4627200.00 30.22 29.76 32.48 30.82 \$1.62 324000.00 4627500.00 31.48 27.29 33.66 30.81 \$1.61 323800.00 4627700.00 29.81 31.42 31.15 30.79 \$1.59 324900.00 4628000.00 30.27 31.99 30.12 30.79 \$1.59 324900.00 462700.00 29.80 27.43 35.11 30.78 \$1.58 324700.00 462700.00 29.80 27.43 35.11 30.78 \$1.58 324700.00 462900.00 30.32 32.38 29.61 30.77			29.65				
324500.00 4629100.00 30.55 31.64 30.35 30.85 51.65 324800.00 4628700.00 28.52 34.06 29.92 30.83 51.63 324900.00 4628700.00 28.93 33.50 30.05 30.83 51.63 324100.00 4628700.00 30.22 29.76 32.48 30.82 51.62 324000.00 4627500.00 31.48 27.29 33.66 30.81 51.61 323801.00 4627700.00 29.81 31.42 31.15 30.79 51.59 324901.01 462700.00 30.27 31.99 30.12 30.79 51.59 324901.01 462700.00 30.27 31.99 30.12 30.79 51.59 324900.01 4627100.00 29.80 27.43 35.11 30.78 51.58 324700.00 4627100.00 29.80 27.43 35.11 30.78 51.57 325200.00 4626100.00 33.54 26.85 31.89 30.76			~~~				
324800.00 4628700.00 28.52 34.06 29.92 30.83 51.63 324900.00 4628700.00 28.93 33.50 30.05 30.83 51.63 324100.00 4628700.00 30.22 29.76 32.48 30.82 51.62 324000.00 4627500.00 31.48 27.29 33.66 30.81 51.61 323801.00 4627700.00 29.81 31.42 31.15 30.79 51.59 324900.00 462900.00 30.27 31.99 30.12 30.79 51.59 324940.90 4627801.10 31.17 29.46 31.71 30.78 51.58 325900.00 4627100.00 29.80 27.43 35.11 30.78 51.58 324700.00 462900.00 30.32 32.38 29.61 30.77 51.57 325200.00 462600.00 33.54 26.85 31.89 30.76 51.56 325100.00 462600.00 32.85 27.28 32.13 30.76							
324900.00 4628700.00 28,93 33.50 30.05 30.83 51.63 324100.00 4627200.00 30.22 29.76 32.48 30.82 51.62 324000.00 4627500.00 31.48 27.29 33.66 30.81 51.61 323800.00 4627700.00 29.81 31.42 31.15 30.79 51.59 324900.00 4629000.00 30.27 31.99 30.12 30.79 51.59 324940.90 4627801.10 31.17 29.46 31.71 30.78 51.58 325900.00 4627100.00 29.80 27.43 35.11 30.78 51.58 324700.00 462900.00 30.32 32.38 29.61 30.77 51.57 325200.00 462600.00 33.54 26.85 31.89 30.76 51.56 325100.00 462600.00 32.85 27.28 32.13 30.76 51.56 324900.00 462600.00 30.76 27.73 33.74 30.74							
324100.00 4627260.00 30.22 29.76 32.48 30.82 51.62 324000.00 4627300.00 31.48 27.29 33.66 30.81 51.61 323800.00 4627700.00 29.81 31.42 31.15 30.79 51.59 324900.00 4629000.00 30.27 31.99 30.12 30.79 51.59 324940.90 4627801.10 31.17 29.46 31.71 30.78 51.58 325900.00 4627100.00 29.80 27.43 35.11 30.78 51.58 324700.00 462900.00 30.32 32.38 29.61 30.77 51.57 325200.00 462600.00 33.54 26.85 31.89 30.76 51.56 325200.00 462600.00 32.85 27.28 32.13 30.76 51.56 325100.00 462600.00 30.76 27.73 33.74 30.74 51.54 324900.00 462600.00 30.76 27.73 33.69 32.58							
324000.00 4627500.60 31.48 27.29 33.66 30.81 51.61 323801.00 4627700.00 29.81 31.42 31.15 30.79 51.59 324900.00 4629000.00 30.27 31.99 30.12 30.79 51.59 324940.90 4627801.10 31.17 29.46 31.71 30.78 51.58 325900.00 4627100.00 29.80 27.43 35.11 30.78 51.58 324700.00 462900.00 30.32 32.38 29.61 30.77 51.57 325200.00 462600.00 33.54 26.85 31.89 30.76 51.56 325200.00 462600.00 32.85 27.28 32.13 30.76 51.56 325100.00 4626800.00 30.76 27.73 33.74 30.74 51.54 324900.00 4626800.00 30.76 27.73 33.74 30.74 51.52 325700.00 4626500.00 27.90 31.69 32.58 30.72							
323800.00 4627700.00 29.81 31.42 31.15 30.79 51.59 324900.00 4629000.00 30.27 31.99 30.12 30.79 51.59 324940.90 4627801.10 31.17 29.46 31.71 30.78 51.58 325900.00 4627100.00 29.80 27.43 35.11 30.78 51.58 324700.00 4629000.00 30.32 32.38 29.61 30.77 51.57 325200.00 4626100.00 33.54 26.85 31.89 30.76 51.56 325200.00 462600.00 32.85 27.28 32.13 30.76 51.56 325100.00 4626800.00 30.76 27.73 33.74 30.74 51.54 324900.00 4626900.00 32.31 25.36 34.49 30.72 51.52 324300.00 462900.00 33.30 28.95 29.91 30.72 51.52 324500.00 4628400.00 28.47 33.59 30.08 30.71							
324900.00 4629000.00 30.27 31.99 30.12 30.79 51.59 324940.90 4627801.10 31.17 29.46 31.71 30.78 51.58 325900.00 4627100.00 29.80 27.43 35.11 30.78 51.58 324700.00 4629000.00 30.32 32.38 29.61 30.77 51.57 325200.00 4626100.00 33.54 26.85 31.89 30.76 51.56 325200.00 4626200.00 32.85 27.28 32.13 30.76 51.56 325100.00 4626800.00 30.76 27.73 33.74 30.74 51.54 324900.00 4626900.00 27.90 31.69 32.58 30.72 51.52 324300.00 4626900.00 32.31 25.36 34.49 30.72 51.52 324500.00 4628400.00 28.47 33.59 30.08 30.71 51.51							
324940.90 4627801.10 31.17 29.46 31.71 30.78 51.58 325900.00 4627100.00 29.80 27.43 35.11 30.78 51.58 324700.00 4629000.00 30.32 32.38 29.61 30.77 51.57 325200.00 4626100.00 33.54 26.85 31.89 30.76 51.56 325200.00 4626200.00 32.85 27.28 32.13 30.76 51.56 325100.00 4626800.00 30.76 27.73 33.74 30.74 51.54 324900.00 4626500.00 27.90 31.69 32.58 30.72 51.52 325700.00 4626900.00 32.31 25.36 34.49 30.72 51.52 324300.00 462900.00 33.30 28.95 29.91 30.72 51.52 324500.00 4628400.00 28.47 33.59 30.08 30.71 51.51							
325900.00 4627100.00 29.80 27.43 35.11 30.78 51.58 324700.00 4629000.00 30.32 32.38 29.61 30.77 51.57 325200.00 4626100.00 33.54 26.85 31.89 30.76 51.56 325200.00 4626200.00 32.85 27.28 32.13 30.76 51.56 325100.00 4626800.00 30.76 27.73 33.74 30.74 51.54 324900.00 4626500.00 27.90 31.69 32.58 30.72 51.52 325700.00 4626900.00 32.31 25.36 34.49 30.72 51.52 324300.00 462900.00 33.30 28.95 29.91 30.72 51.52 324500.00 4628400.00 28.47 33.59 30.08 30.71 51.51							51,58
324700.00 4629000.00 30.32 32.38 29.61 30.77 \$1.57 325200.00 4626100.00 33.54 26.85 31.89 30.76 \$1.56 325200.00 4626200.00 32.85 27.28 32.13 30.76 \$1.56 325100.00 4626800.00 30.76 27.73 33.74 30.74 \$1.54 324900.00 4626500.00 27.90 31.69 32.58 30.72 \$1.52 325700.00 4626900.00 32.31 25.36 34.49 30.72 \$1.52 324300.00 462900.00 33.30 28.95 29.91 30.72 \$1.52 324500.00 4628400.00 28.47 33.59 30.08 30.71 \$1.51			- 3313				51,58
32\$200.00 4626100.00 33.54 26.85 31.89 30.76 \$1.56 32\$200.00 4626200.00 32.85 27.28 32.13 30.76 \$1.56 32\$100.00 4626800.00 30.76 27.73 33.74 30.74 \$1.54 32\$100.00 4626500.00 27.90 31.69 32.58 30.72 \$1.52 32\$700.00 4626900.00 32.31 25.36 34.49 30.72 \$1.52 324300.00 462900.00 33.30 28.95 29.91 30.72 \$1.52 324500.00 4628400.00 28.47 33.59 30.08 30.71 \$1.51			30.32	32.38	29.61		
325100.00 4626800.00 30.76 27.73 33.74 36.74 51.54 324900.00 4626500.00 27.90 31.69 32.58 30.72 51.52 325700.00 4626900.00 32.31 25.36 34.49 30.72 51.52 324300.00 4629400.00 33.30 28.95 29.91 30.72 51.52 324500.00 4628400.00 28.47 33.59 30.08 30.71 51.51	325200.00	4626100.00					
324900.00 4626500.00 27.90 31.69 32.58 30.72 51.52 325700.00 4626900.00 32.31 25.36 34.49 30.72 51.52 324300.00 4629400.00 33.30 28.95 29.91 30.72 51.52 324500.00 4628400.00 28.47 33.59 30.08 30.71 51.51							
325700.00 4626900.00 32.31 25.36 34.49 30.72 51.52 324300.00 4629400.00 33.30 28.95 29.91 30.72 51.52 324500.00 4628400.00 28.47 33.59 30.08 30.71 51.51					_		
324300.00 4629400.00 33.30 28.95 29.91 30.72 5f.52 324500.00 4628400.00 28.47 33.59 30.08 30.71 5f.51							
324500L00 4628400.00 28.47 33.59 30.08 30.71 51.51							
2-14-14-14-14-14-14-14-14-14-14-14-14-14-							
■ JETTMIANT TREE YEARS AND 31.07 EAST 20.33 30.71 1							
327250.00 4625750.00 36.26 25.14 30.72 30.71 51.51							
323600.00 4627200.00 31.95 27.41 32.73 30.69 51.49							
325150.00 4627980.00 30.70 30.84 30.53 30.69 51.49							
323900.00 4627700.0D 29.99 31.03 31.03 30.68 51.48				***			
324100.00 4627600.00 31.62 29.37 32.00 30.67 \$1.47							
324100.00 4628200.00 30.03 32.72 29.19 30.65 51.45					29,19	30.65	
325103.00 4627907.90 31.57 29.60 30.76 30.64 51.44			31,57		30.76	30.64	
325800.00 4626900.00 32.35 25.52 34.04 30.63 51.43	325800.00	4626900.00	32.35	25.52	34.04	30,63	51.43

Cumulative Analysis - 1-hr SO₁ Results

UTM(E)	DTM (N)	2608 Concentration	2009 Concentration	2810 Concentration	3-yr Average	3-yr Average + Background
(m)	(11)	(ug/ni ³)	(ug/m³)	(ug/m³)	(ug/m³)	(ug/m³)
324105.70	4627599.20	30.62	29,24	32.01	30.62	51.42
	4627900.00	30.74	30.09	31,03	30.62	51.42
	4629400.00	33.10	28.45	30.29	30.61	51.41
325600.00	4626900.00	30.98	28.90	31.94	30,60	51.40
324103.90	4627523.10	31.09	26.61	34.10	30,60	51.40
	4627300,00	30.94	26.74	34.07	30.58	51.38
324900.00	4628800.00	28.96	33.92	28.86	30.58	\$1,38
324600.00	4629100.00	30.00	32.29	29.44	30.58	51.38
324517.30	4627727.90	30,42	30.32	30.99	30.57	S1.37
	4629300.00	33,02	28.48	30.20	30.57	51.37
	4627727.00	31.68	30,18	29.77	30.54	51.34
		30.94	28,22	32.45	30.54	51.34
		29.87	33.22	28,48	30.53	51.33
325000.00	4628800.00	28.71	33.55	29,21	30.49	51.29 51.29
	4626700.001	26.98	30.39	34.09	30,49 30,49	51.29
324200.00 323700.00	4629400.00 4627200.00	33.28 31.42	28.48 27.84	29.71 32.20	30,49	51.29 51.29
	4629400.00	33.27	28.77	29.43	30.49	51,29
	4626500.00	28,27	29.07	34.11	30.49	\$1,28
324800.00		30.09	31.71	29.64	30.48	51.28
324800.00	4628800.00	28.37	34,17	28.88	30.48	51.28
323900.00		30.28	28.70	32.39	30.46	51.26
325200.00	4629000.00	27.61	32,49	31.15	30.41	S1.21
	4628100.00	29.79	32.67	28.76	30,41	51.21
324600.00	4629000.60	30.04	32.88	28,29	30,40	51.20
326000.00	4627200,00	30.60	26.35	34.25	30.40	51.20
32/1600.00		30.71	30.33	30.15	30,40	St.20
325000.00	4627900.00	31,11	29.27	30.76	30.38	53.18
324500.00	4629200.00	31.33	29,78	30.02	30.38	51.18
325000.00	4628700.00	28.23	32,86	30.01	30.37	S1.17
324700.00	4628500.00	27.70	33.16	30,24	30.37 30.34	51.17 51.14
	4628200.00	29.60	32.58	28,84		51.14
324106,00	4629400.00 4628900.00	33.11 27.63	28.64 33.35	29,22 29,98	30,32 30,32	51.12
325HH0,0H	4627561.20	30.94	27.55	32.42	30,30	51,10
324000.00		30.08	30.58	30.23	30,30	51,10
325200.00	4626400.00	31,19	27.91	31.66	30.26	51.06
	4627801.80	30.72	28.16	31.89	30.25	51.05
324750.00	4625000.00	24.05	30,21	36.50	30.25	S1.0S
323800.00	4627200.00	30.85	27.59	32,31	30.25	51.05
325100.00	4626500.00	27.25	31.38	32,11	30.24	51.04
	4627810.00	29.92	29.95	30.83	30.23	51.03
324600,00	4627800.00	31.28	30.47	28,92	30.23	51.03
323900.00		30.24	26.55	33.88	30,22	51.02
	4627000.00	28.33	27.53	34.80	30,22	51.02
324107.60	4627677.90	29,48	30.61	30.54	30.21	51,01
324472.40	4627728.70	29,75	30.54	30.34	30.21	53,01
324600.00	4628400.00	28.57	32,47	29.53	30.19	50.99 50.95
325000.00	4626600.00 4628800.00	25.57	32,79	32.10 29.45	30.15 30.15	50.95
325100.00	4629300.00	27.88 31.89	33.11 28.50	30,02	30.13	50.94
324500,00 325532.20	4628100.00	29.99	29.97	30,62	30.14	50.93
324300.00	4628200.00	29.51	32.37	28.48	30,12	50.92
324800.00	4628600,00	27.15	32.99	30.18	30,11	50.91
324500.00		32.59	28.21	29.52	30.11	50,91
324000.00	4628000.00	29.59	31.93	28.78	30.10	50,90
324600.00	4629400.00	32,62	28.03	29.53	30.06	50,86
324500.00	4628300.00	29,12	31.89	29.15	30.05	50.85
324700.00	4629100.00	29.62	32,13	28.39	30.05	50.85
325300.00	4626700.00	31.16	27,19	31.69	30.02	50.82
324200.00	4628100.00	29.55	32,14	28.33	30.01	18.02
32450000	4627800.00	29.82	31.00	29,19	30.01	50.81

UTM(E)	UTM (N)	1008 Concentration1	2009 Concentration	2010 Concentration	3-yr Average	3-yr Average + Background
(m)	(m)	(ug/m³)	(ug/ar*)	(ug/m²)	(ug/m)	(ug/m³)
		27.76	32.60	29.58	29.98	50.78
325200.00 325126.50	4628800.00 4627944.00	30,91	29.23	29.78	29.98	50.78
	4627354.50	28,46	26.77	34.56	29.93	50,73
	4626800.00	31,22	28.91	29,62	29.91	50.71
324750.00	4624750.00	26,52	28.95	31.22	29.89	50,69
	4629100.00	29.68	30.82	29.18	29.89	50.69
	4629200.00	29.96	30.16	29.46	29.86	50.66
	4626900.00	30.56	25.43	33.58	29.86	50.66
			28,59	31.37	29,85	50.65
324755.70	4627727.20	29.58 29.39	30,44	29.68	29.84	50.64
324109.30	4627740.40		27.95	30.00	29.84	591.64
	4629500.00	31.56 29.61		29.65	29.83	50.63
324108.60	4627717.30		30.23 32.75	29.78	29.83	50.63
324900.00	4628600.00	26,96 32,43	27.49	29.54	29.82	50.62
	4629500.00	·		29,24	29.82	\$0.62
	4629100.00	29.06	31.17	28,73	29.82	50.62
	4628900.00	28.09				50.61
	4628500.00	27.82	31.80	29.80	29.81	50.60
325 (00.00	4626700.00	26.60	29,27	33.55	29,80	50.60
324400.00	4628200.00	29.35	32,08	27.97	29,80	
325200.00	4628900.00	28.04	32.97	28.39	29.80	50.60
324427.50	4627729,50	29.75	30.21	29.42	29.79	50.59
324100.00	4627700.00	29.52	30.19	29.66	29.79	50.59
324700.00	4627900.00	29.61	29.19	30.50	29.77	50.57
325000.00	4629100.00	29,65	30.96	28.69	29.76	50.56
324300.00	4629500.00	32,31	28.20	28,78	29.76	50.56
325190.00	4628004.00	29.69	28.64	30.94	29.75	50.55
324800.00	4629200.00	29.67	30.89	28.68	29.75	50.55
324756.70	4627765.40	29.19	29,19	30.85	29,74	\$0.54
326305.10	4627355.40	28.41	26.58	34.23	29.74	50.54
324154.80	4627738.80	29.48	30,22	29.50	29.73	50.53
325200.00	4626300.00	29,48	27.56	32.11	29.72	50.52
326200.00	4627300.00	28,82	26.62	33.62	29.69	50,49
324600.00	4629500.00	32,56	27.87	28,62	29.68	50.48
324900.00	4626600.00	26.02	30.02	32,99	29.67	50.47
324000,00	4627300.00	30.64	26.37	32.57	29.66	5 0 .46
324849,40	4627802.40	30.14	28.84	29.95	29.64	50.44
324803.60	4627803.10	29.57	29,39	29.94	29,63	50.43
324400.00	4629500,00	32.51	27,83	28.50	29,61	50.41
325300.00	4628800.00	28.05	31.93	28.76	29.58	50.38
324600.00	4629300.00	31,02	28.22	29.50	29.58	50,38
	4628200.00	29,14	31.36	28.22	29.58	50.38
325500.00	4629100.00	26.69	31.66	30,32	29.55	50,35
	4628400.00	28.58	31.20	28,88	29.55	50,35
326000,00	4627100.00	27.65	26.16	34.83	29.55	50.35
325500,00	4626700.00	29.65	29.67	29.31	29.54	50.34
325100.00	4628900.00	27.46	33,21	27.95	29,54	50.34
324200.20	4627737.30	29.28	29.99	29.31	29.53	50.33
324900.00	4627900.00	29.84	28,26	30.40	29,50	50.30
325400.00	4628900.00	27.30	32,23	28.96	29.50	50.30
324400.00	4627800.00	2X.72	30.55	29.21	29.49	50.29
324757.80	4627803.70	29,26	29.52	29.70	29.49	50,29
324600.00	4628300.00	29,04	31.71	27.68	29.48	,50,28
	4629100.00	29.47	31.45	27,46	29.46	50.26
3248(0),00	4629500.00	31.97	27.05	29,22	29.42	50.22
	4627356.20	28.15	26.19	33.90	29.41	50.21
	4627731.10	28.64	30.13	29.46	29.41	50.21
324336.60		28.61	30.03	29.58	29,41	50.21
	4629300.00	30.49	28.52	29.20	29,40	50.20
	4628600.00	27.09	31.79	29.33	29,40	50.20
	4629600.00	26.57	32,45	29.17	29,40	50.20
	4628000.00	29.26	31.15	27.76	29.39	50.19
324100 00						

1 abic 14-3 Cumulative Analysis - I-hr SO₂ Results

TIPO ACPI	TITLE	2000 (2000 C	2010 (2		
UTM(E)	UTM (N)	2008 Concentration ³ (ag/m ³)	2009 Concentration	2010 Concentration ³	3-yr Average (ug/m ³)	3-yr Average + Background (ug/m²)
(NI)	(m)		(ug/m³)	(ug/is³)		
324245,70 324200,00	4627735.70 4627800.00	29.03 28.27	29.80 30.46	29.29 29.39	29.38	50.18
	4629200.00	29.34	30.91	27.84	29.37 29.36	50.17 50.16
324000.00	4627900.00	29.10	30.34	28.62	29.36	50.16
324300.00	4628100.00	29.27	31.34	27.42	29.34	50.14
324200.00	4628000.00	28.87	30.47	28.68	29,34	50.14
	4628000.00	29,88	28,09	30,03	29.34	50, 14
	4628780.00	27,03	32,15	28.79	29,32	50,12
327500.00	4625500.00	34.85	23.97	29.14	29.32	50.12
324800,00	4629100.00	29.20	31.84	26.90	29.31	50.11
326000.00	4627090.00	27.11	26.39	34.43	29.31	50.11
324900.00	4628500.00	27.91	30.72	29.28	29.30	50.10
326100.00	4627100.00	27.46	25.86	34.55	29.29	50.09
325100.00	4626600.00	25.21	30.85	31.76	29.27	50.07
324800.00	4628400.00	28.51	31.05	28.15	29.24	50.04
324400.00	4627900.00	28.57	30.52	28.58	29.22	50.02
324700.00	4629400.00	31,43	26,94	29,30	29,22	50,02
3256(X).(X)	4629000,00	27.56	31,82	28,24	29,21	50.01
325600,00 324300,00	4628200,00	29.17 28.44	29,13 30,09	29,32 29.02	29.21 29.18	50.01 49.98
	4627800.00					
325000.00 325100.00	4629600.00 4628000.00	31.61 29.21	26.81 28.97	29.07 29.31	29.16 29.16	49.96 49.96
325600.00	4629200.00	27.35	30.63	29.49	29.16	49.96
326200.00	4627100.00	27.28	25.89	34.29	29.15	49.95
324100.00	4627300.00	30.03	26.15	31.27	29.15	49.95
326100.00	4627200.00	28.58	24.80	34.04	29.14	49.94
	4629600.00	31.86	27.31	28.20	29.12	49,92
325500.00	4628960,00	26,69	31,64	29,00	29.11	49.91
324800.00	4629300.00	29.99	28.45	28.86	29.10	49.90
324700.00	4628360.00	28.89	31.25	27.16	29.10	49.90
	4627357.10	28.02	25.69	33.58	29.10	49.90
	4627300.00	28.76	25.63	32.88	29.09	49.89
	4628300.00	28.88	28.45	29.92	29.08	49.88
	4629000.00	27.20	32.12	27.91	29.08	49.88
324500.00	4629600.00	31,52	27.33	28.34	29,06	19.86
3243(6).(6)	4627900.00	28,35	29,90	28,92	29.06	49.86
	4629300,00 4628100,00	29.57 29.53	29.09 30.45	28.50 27.18	29.05 29.05	49.85 49.85
-	4627900.00	28.59	28.70	29.86	29.05	49.85
	4628000.00	28.44	30.20	28.46	29.03	49.83
324600.00	4628100.00	28.96	28.95	29.16	29.02	49.82
	4629600.00	30.74	26.99	29.27	29.00	49.80
	4627100.00	27.40	25.48	34.08	28.99	49.79
	4627900.00	28.47	30.05	28.42	28,98	49.78
325000.00	4628500.00	27.95	30.29	28,68	28,97	49.77
325100,00	4628600,00	27,19	30,81	28,91	28.97	49.77
	4629200,00	28,Dt	30.40	28,44	28.96	49.76
	4629300.00	29.33	29.49	28.03	28.95	49.75
	4629600.00	31.74	27.18	27.64	28.85	49.65
	4628200.00	28.89	30.57	27.07	28.84	49.64
	4627900.00	28.47	29.79	28.23	28.83	49.63
	4626900.00	28.31	24.70	33.32	28.78	49.58
	4627900.00 4628000.00	28.17 28.47	30.01 28.22	28.10 29.53	28.76	49.56 49.54
	46287(6),00	26,30	28.22 31,40	28.51	28.74	49.54
-	4628400,001	28.43	30.40	27.37	28,73	49.53
	4629460.00	30,20	26.87	29.01	28.69	49.49
	4628900.00	27.34	30.89	27,82	28.68	49.48
	4626700.00	27.84	26.66	31.53	28.68	49.48
	4626100.00	32.68	23.50	29.84	28.68	49.48
-	4626900.00	27.34	24.43	34.26	28.67	49.47
	4629300.00	28.71	29.89	27.42	28.67	49.47

Cumulative Analysis - 1-lar 80₂ Results

UTM(E)	UTM (N)	2008 Concentration	2009 Concentration	2010 Concentration	3-yr Average	3-yr Average + Background
(m)	(m)	(11g/in ³)	(ng/m²)	(ug/in³)	(ug/m³)	(ug/nt³)
326453.50	4627357.90	27.86	24.89	33.26	28.67	49.47
325200.00	4628100.00	28,31	27.95	29,66	28.64	49.14
325200.00	4629200.00	28,91	30.24	26,71	28.62	49.42
325100.00	4628500.00	27.94	29.83	28.01	28.59	49.39
324500.00	4628000.00	28.57	29.43	27.74	28.58	49.38
325600.00	4629100.00	25.70	31.62	28.41	28,58	49.38
325300,00	4626400.00	30.20	25,18	30.34	28.57	49.37
	4628100.00	28.92	29,50	27.27	28.56	49.36
	4628300,00	28.65	30.22	26.79	28.55	49.35
	4628000,00	27.97	29.50	28.18	28.55	49,35
326400.00	4627100.00	27.37	24.37	33,90	28.55	49,35
325600.00	4626800.00	29.20	27.26	29,16	28.54	49.34
325200.00	4628600.00	27,25	29.86	28.48	28.53	49.33
325500.00	4626600.00	30,12	27.24	28.03	28.46	49.26
325000.00	4629400.00	29.46	27.69	28.23	28.46	49.26
324700.00	4628000.00	28.61	27.92	28.80	28.44	49.24
3251610.610	4629600.00	30.76	26.25	28.22	28,41	49.21
	4626500.00	26.88	27.31	31.00	28.40	49.20
326200.00		27.45	23,87	33.85	28.39	49.19
325800.00	•	25.99	30.96	28.17	28.38	49,18
	4626600.00	28.94	26.48	29.70	28.37	49,17
	4627000.00	26, 14	24.92	34.06	28.37	49.17
325800.00	4629100.00	26,38	31.29	27,43	28.37	49.[7
	4627358.80	27.70	24.38	32.95	28.34	49.14
	4627000.00	27.48	23.85	33.68	28.34	49.14
325300300	4628700.00	26.49	30.56	27.96	28,33	49.13
	4625750.00	31.78	25.85	27.34	28,32	49.12
	4628052.00	26.79	28.25	29.94	28.32	49,12
	4628900.00	26.68	30.57	27.72 33.88	28.32 28.31	49.11
325200.00	4627200.00	27.26 28,56	23.81 29.82	26,55	28.31	49.11
325400.00	4629300.00 4628800.00	26,87	30.76	27,22	28.28	49.08
325300.00	4626600.00	28,23	26.70	29.90	28.28	49.08
325100.00	4629400.00	29.17	27.78	27.79	28.25	49.05
326400,00	4627300.00	27.58	24.89	32.26	28,24	49.04
325000,00	4629500.00	29.92	26,37	28.43	28,24	49.04
324900.00	4628300,00	28.23	30.66	25.81	28.23	49.613
	4629200,00	28.59	30.61	25.48	28.23	49.03
	4628400.00	28.31	29.76	26.54	28.20	49,00
	4628000.00	27,25	28.64	28,71	28.20	49.00
	4627200.00	27,92	23.21	33.46	28.20	49.00
	4625500.00		24.75	28.01	28.17	48.97
	4628200.00	28.81	29.55	26.00	28.12	48.92
	4628800.00	26.06	29.49	28.79	28,11	48.91
325600,00	4628800.00	25.90	30.50	27.90	28,10	48.90
326300.00	4627000.00	27.34	23,56	33.33	28.08	48.88
	4628100,00	27.19	29,27	27.75	28.07	48.87
	4627359.60	27.44	24.06	32.64	28.05	48.85
	4629300.00	27.98	28.94	27.09	28.00	48,80
	4628600.00	27.00	29.19	27,68	27.95	48.75
	4628000.00	27,22	27.47	29.10	27.93	48.73
	4627360.50	27.34	24.05	32,34	27.91	48.71
	4628700.00	26.55	29.69	27.47	27.90	48.70
	4627100.00	27.21	23.15	33.32	27,89	48.69
	4626800.00	26.83	28,28	28.43	27,85	48.65
	46269001.00	26.64	24.27	32.62	27,84	48.64 48.60
	4626600,00	26.48	27,35	29.58	27.80	48.59
	4628500,00	27.39	29,10	26.88	27.79	48.59 48.56
	4626700.00	28.48	27.38	27.40	27.76	48.54
	4625750.00	31.33	24.04	27.85	27.74 27.74	48.54
	4627000.00	27.22	22.90	33.09	27.72	48.52
3200UU.UU	4627000.00	27.00	23.59	32,58	47.74	40.3%

UTM(E)	OTM (N)	2008 Concentration	2069 Concentration	2010 Concentration	3-yr Average	3-yr Average + Background
(m)	(m)	(ag/m³)	(ug/n: ³)	(ug/nt³)	(ng/m²)	(ug/m²)
325100.00	1629500,00	29.18	25.85	28,12	27.72	48.52
	4628700.00	25.77	29.34	28.04	27.72	48.52
	4627100.00	27.12	22.92	33.01	27.68	48.48
	4628600.00	26,42	29.46	27.14	27,68	48.48
	4627361.30	27,16	23.81	32.04	27,67	48.47
325900.00	4626800.00	27.38	24.412	31.48	27.63	48.43
325400.00	4626500.00	29.09	24,67	29.10	27.62	48,42
325300.00	4626500.00	26.89	26,91	29.01	27.61	48,41
	4627100.00	27.01	23.[2	32.69	27.61	48.41
	4626400.00	29.51	23.95	29.34	27.60	48.40
	4628100.00	27.18	28.36	27,26	27.60 27.59	48.40 48.39
	4627300.00	26.92	23.67 27.19	32,18 27,10	27.58	48.38
326500.00	4626600.00 4627200.00	28.44 26.81	22.68	33.22	27.57	48.37
325600.00	4628700.00	25.69	28.79	28.19	27.55	48.35
325500.00	4628800.00	25,71	29.95	26.97	27.54	48.34
326700.80	4627362.20	27.03	23.85	31.75	27.54	48.34
325100.00	1628400.00	27.86	29,10	25.67	27.54	48.34
	4626000.00	31.79	23,36	27.43	27.53	48.33
	4628600.00	26.65	28.68	27.20	27.51	48.31
	4628100.00	27.71	28.35	26.45	27.50	48.30
	4628100.00	27.23	27.11	28.16	27.50	48.30
	4627000.00	26.80	23.58	32,12	27.50	48.30
	4626900.00	26,42	24.23	31.82	27.49	48.29
	4626380.00	31,18	24.73	26.53 30.97	27,48	48.28 48.25
326000.00	4626800.00	27.50	23.87 23.06	32.37	27.45 27.44	48.24
326800.00 324800.00	4627100.00 4628200.00	26.89 27.72	28,49	26.00	27.40	48.20
	4627363.00	26.87	23.71	31.59	27.39	48.19
325400.00	46285001.00	26.65	29.77	25.67	27.37	48.17
	4626200.00	32.79	22.48	26.81	27.36	48.16
	4628100.00	26.61	26.96	28.48	27.35	48.15
325300.00	4628500.00	27,11	28.65	26.23	27.33	48.13
325800.00	4626800.00	26,12	25.27	30.56	27,32	48.12
	4627300.00	26.48	23.38	32.08	27.31	48, £1
325700.00	4628700.00	25.49	28.79	27.60	27.29	48,09
325600.00	4628600.00	26.14	29,32	26.41	27.29	48.09 48.09
	4628400.00 46272(8),00	26.59 26.58	27.45 22.28	27.82 32,99	27.29 27.28	48.08
	46272000.00	26.60	23.50	31.71	27.27	48.07
	4627100.00		22.99	32,05	27.27	48.07
	4627363.90	26,71	23.53	31.51	27,25	48.05
	4628076.00	25,93	27.68	28.01	27,21	48.01
324900.00	4628100.00	26.78	27.73	27.10	27.20	48,00
	4626200.00	32.48	22.32	26.61	27.14	47.94
	4625000.00	27.84	27,37	26.19	27.13	47.93
	4627100.00	26.63	23,03	31.72	27.12	47,92
	46273001.00	26.12	23.25	31.98	27.12	47.92
	46283(K),(H)	26.98	27.05	27.30 31.42	27.11 27.10	47.91 47.90
	4627364.70 4628200.00	26.54 26.81	23.35 27.75	26.65	27.10	47.87
	4627156.90	26,47	23.18	31.55	27,07	47.87
	4627158.10	26.51	23.03	31.66	27.07	47.87
	4627159.20	26.55	22.86	31.76	27.05	47.85
	4627200.00	26.56	22.00	32.56	27.04	47,84
	4626500.00	29.10	24.28	27.72	27.03	47.83
326700,00	4627200.00	26.29	21,97	32.78	27.01	47.81
	4627100.00	26.48	23,07	31.39	26.9B	47.78
	46264001.00	29.64	23.71	27.51	26.95	47.75
•	4627(KN1.0D	26.40	23.15	31.31	26.95	47.75
	4627200.00	26.53	21.99	32,33	26.95	47.75
326898.70	4627365.60	26.37	23.13	31.29	26.93	47.73

DTM(E)	BTM (N)	2008 Concentration ¹	2009 Concentration	2010 Concentration	3-yr Average	3-yr Average + Background
(m)	(as)	(ug/m³)	(ug/m²)	(ug/m²)	(ug/m ³)	(ug/m³)
325300.00	4628100.00	25.18	27.51	28,03	26.91	47.71
326200.00	46263031.00	26.71	23.47	30,49	26,89	47.69
	46272001.00	26.49	21.96	32,10	26,85	47.65
325700.00	4628680,00	25.76	29.12	25.63	26,84	47.64
326100.00	4626800,00	26.73	23.28	30.44	26.82	47.62
326300.00	4626800.00	25,60	23.31	31.50	26.80	47.60
325500.00	4628500.00	26.10	29.48	24.82	26.80	47.60
327200.00	4627100.00	26.33	22.99	31.05	26.79	47.59
325441.10	4628100.00	25.63	27,25	27.30	26.72	47.52
326948.10	4627366.40	26.19	22,86	31.12	26.72	47.52
326800.00	4627300.00	25.66	22.61	31,90	26.72	47.52
	4627300.00	25.59	22.92	31,65	26.72	47.52
	4628400.00	26.52	29.69	23.91	26,71	47.51
325000.00	4628300.00	27.28	28.29	24.50	26,69	47.49
325200.00		27,03	28.23	24.76	26.67	47.47
326900.00		25,53	22.70	31.78	26.67	47.47
325700.00	4626600.00	27.58	25.80	26.52	26.64	47,44
326900.00	4627000.00	26.19	22,79	30.91	26.63 26.63	47.43 47.43
325700.00 327300.00	4626200.00 4627100.00	31.72 26.16	22,24 22,99	25.92 30,72	26.62	47.42
				31.85	26.59	47.39
327099.60 326500.00	4627201.20 4626900.00	25.99 26.01	21.94 22.59	31.18	26.59	47.39
327098.10	4627285.10	25.20	22.92	31.61	26,58	47.38
	4627000.00	25.97	23.18	30.51	26,55	47.35
	4626700.00	26.41	26.48	26.75	26,55	47.35
	4625750.00	30,61	21.80	27.22	26.55	47,35
326400.00	4626900.00	26.15	22.13	31.30	26.53	47,33
326997.60	4627367.30	26.01	22,59	30.94	26.51	47.31
	4625750.00	29.42	23.95	26.16	26.51	47.31
327098.90	4627243.10	25.11	22.50	31.80	26.47	47.27
32,5600,00	462640D.IKO	29.92	23.92	25,52	26,45	47.25
325600,00	4626500.00	28.52	24.54	26,28	26,45	47.25
327100.00	4627000.00	25.75	23.48	30.11	26.44	47.24
325700.00	4626700.00	26.71	26.72	25.86	26.43	47.23
327097.30	4627327.00	25,29	22.64	31.28	26.40	47,20
	4628100.00	24.87	27.12	27.17	26.39	47.19
327250.00	4625000.00	26.49	25,85	26.67	26.34	47.14
327047.00	4627368.10	25.83	22,33	30.86	26.34 26.31	47.14 47.11
325800.00	4626100.00	30.68	22.14	26.10 29.71	26,29	47.09
327200,00 325700,00	4628500.00	25.52 24.98	23.65 28.75	25,05	26.26	47.06
	4626900.00		22.50	30.57	26,26	47.06
325900.00		30.25	21.63	26.77	26,22	47.02
	4627369.00	25,65	22.28	30.69	26.21	47,01
	4628500.00	25,53	29.14	23.94	26.20	47,00
	4628400.00	25.0M	28.22	25.33	26.20	47.00
	4626200.00	31.07	21,78	25.64	26.16	46.96
	4628300.00	26.56	27.83	23.94	26.11	46.91
1	4627000.00	25.28	23.74	29.31	26.11	46.91
	4628400.00	25.81	29.25	23,25	26.11	46.91
	4628200,00	25.68	27.53	25.05	26,69	46.89
	4628100,00	25.08	27.53	25,55	26,05	46.85
	4626800.00	24.36	23.14	30.62	26.04	46.84
	4628200.00	25.25	26.34	26.53	26.04	46.84
	4626100.00	30.15	21.36	26.61	26.04	46,84
	4626700.00	24,96	24.91	28.23	26.03	46.83
	4626700.00	25.28	25,11	27.68	26.03	46.83
	4626900.00	25.40	22,57	30.01	25.99	46.79
326250.00	1626000.00	29.52	21.82	26.53	25.96	46.76
325700.00	4626300.00	29.29	23,53	24.99	25.94	46.74 46.73
325300,00	4628200.00	24.75	26.87	26,15	25.93	46.73 46.72
325700.00	4626/100:00	29.47	23.55	24.73	25.92	40.72

UTM(E)	UTM (N)	2008 Concentration	2009 Concentration	2010 Concentration	3-yr Average	3-yr Average + Background
(m)	(m)	(ug/nt ¹)	(ng/m³)	(ng/nt ²)	(og/in ³)	(ug/nt³)
	4627000.00	25,04	23.76	28.92	25.91	46,71
325100.00		25.50	27.27	24.92	25.90	46.70
326800.00		25.12	22,95	29.52	25.87	46.67
326100.00	4626100.00	29.97	2),40	26.21	25.86	46.66
325800.00	4626600.00	27.50	24.05	25.97	25.84	46.64
325200.00	4628300.00	25.83	27.68	23.64	25.72	46.52
	462GH0.00	29.45	20.69	26.95	25,70	46.50
	4626900.00	24.84	23.06	29.05	25,65	46.45
	1626000.00	28.79	21.11	26.91	25.63	46.41
\longrightarrow	4628400.00	25.09	28.77	22.70	25,52	46.32
	4628200.00	24,75	26.68	25.14 23.52	25.52 25.50	46,32 46,30
	4626200.00	25,09 30,52	27.89	25.01	25.48	46.28
	4626900.00	24.56	23.25	28.58	25.46	46.26
	4625750.00	28.72	22,24	25.40	25.46	46.26
	4625500.00	28.99	22,33	24.97	25.43	46.23
	4626100.00	29.52	21.42	25,34	25.43	46.23
	4628200.00	24.42	27.31	24.32	25,35	46.15
	4626200.00	30.22	20.80	24.92	25,31	46.11
	4626900.00	24,29	23.52	28.14	25.31	46,11
	4626800.00	24,31	23.10	28.51	25.31	46,11
	4626500.00	28.3 t	24.70	22.84	25.2B	46.08
	4626800.00	24.09	23.34	28.25	25.23	46.03
	4628360.00	24.28	27,26	24.11	25.22	46.02
	4626900.00	24.00	23,71	27.70	25.14	45.94
	4626700.00	23.58	23.74	27,88	25.06	45.86
$\overline{}$	4626000.00	27.80	21.02	26,32	25.05 25,02	45.85 45.82
	4626480.00 4626700.00	29.16 24,27	22.99 23.21	22.91 27.37	24.95	45.75
	4628300.00	23,78	27.00	24.00	24.93	45,73
325800.00		28.55	21.90	24.26	24.90	45.70
	4626000.00	28.17	20.38	26.08	24.88	45.68
	4626100.00	29.32	20.47	24.79	24.86	45.66
327300.00	4626960.00	23.72	23,51	27.26	24.83	45.63
325900.00	46266681.00	25.02	23.64	25.78	24.81	45.61
326250,00	462550KL00	26.67	24.33	23,34	24.78	45.58
	4626100,00	30.15	19.45	24.68	24.76	45.56
	4626500,00	27.10	24.34	22.83	24.76	45.56
	4626400.00	29,00	22.11	23.11	24.74	45,54
	4626300.00	27.73	22,51	23.95	24.73 24.73	45.53
326700.00 326600.00		23.52	22,99	27.68	24.73	45.53 45.52
	4626600.00	29.83 24.89	19.79 23,21	24.55 25.90	24.67	45.32 45.47
	4626960.00	23.44	23.65	26,82	24.64	45.44
326100.00		28.00	21.81	24,00	24.60	45.40
	4626300,00	27.74	22.02	23.98	24,58	45.38
	4626700,00	25.70	21.03	26.83	24,52	45.32
326300.00	4626200.00	29,48	20.06	24.00	24.51	45.31
326400.00	4626100.00	29,11	20.20	24.15	24.49	45.29
326900.00	·	29,92	19.13	24.34	24.46	45.26
	4626100.00	29.74	19,07	24.57	24.46	45.26
	4626700.00	25.§3	21,96	26.22	24.44	45.24
	4626900.00	23.15	23.76	26.39	24.43	45.23
	4626100.00	29.34	19,49	24.46	24.43 24.43	45.23 45.23
326300,00	4626700.00 4626400.00	25.32 28.68	21.09	26.88 23,35	24.41	45.23
326600.00 -		28.68	19.35	24.32	24,35	45.85
326400.00		28.06	19.78	25.18	24,34	45.14
326800.00		23,17	22.61	27.10	24,29	45,09
326200.00		23,85	22.12	26.86	24,28	45.08
	4626100.00	29,42	19.17	24.13	24.24	45.04
320700.00						

TREE D-3 Consulative Analysis - 1-br SO₄ Results

BTM(E)	DTM (N)	2008 Concentration	2009 Concentration	2010 Concentration	3-yr Average	3-yr Average + Background
(m)	(ns)	(ug/m³)	(ug/m³)	(ug/n: ¹)	(ug/m²)	(ug/m³)
	4626400.00	28.17	19.82	24.68	24,22	45.02
326300.00 326600.00	4626400.00	27.54	19,29	25.83	24.22	45.02
326100.00	4626600.00	24.29	22,43	25.72	24.15	44.95
3276(k),(N)	4626900.00	22.85	23,47	25.94	24.09	44,89
3261(R),(R)	4626400.00	28.39	20.18	23.68	24.08	44.88
326200.00	4626400,00	28.26	19.77	24.16	24.06	44.86
326500.00	4626400.00	27,81	19.51	24,80	24.01	44.84
	4626100.00	28.59	18.97	24,54	24.03	44.83
326400.00	4626200.00	28.97	19.45	23.68	24.03	44.83
326900.00	4626800.00	22,85	22.57	26.59	24.00	44.80
326300.00	4626600.00	23.75	21.44	26.82	24.00	44.80
326700.00	4626400.00	27.27	£9.31	25.38	23.99	44.79
325900.00	4626500.00	26.26	22,18	23.48	23.97	44.77
326400.00	4626500.00	24.99	19.95	26.80	23.92	44.72
326200,00	4626300.00	27.32	20.39	23.80	23.84	44.64
327000.00	4626800.00	22.54	22.85	26.10	23.83	44,63
326800.00	4626200.00	28.06	18.97	24.47	23.83	44.63
326500.00	4626200.00	28,54	19.03	23,77	23.78	44.58
327200.00	4626100.00	27.68	19.05	24.55	23.76	44.56
326600.00	4626700.00	23.46	22.09	25.68	23,75	44.55
326100.00	4626500.00	25.14	21.05	24.89	23,69	44.49
326500.00	4626500.00	25.04	19,46	26.47 25.46	23.66 23.64	44.46 44.44
326200.00	4626500.00	25.00 25.30	20,46 21,42	25.46	23.62	44,42
326900.00 326900.00	4626500.00 4626200.00	27.73	18.58	24.36	23.56	44,36
326400.00	4626300.00	26.76	19.66	24.22	23.55	44.35
326300.00	4626300.00	27.11	19.49	24.00	23.53	44.33
327200.00	4626200.00	27,40	19.09	24.06	23.52	44.32
327100.00	4626800.00	22,34	22.55	25.65	23,51	44.31
327100.00	4626200.00	27.38	18.91	24.15	23,48	44.28
327000.00	4626200.00	27.38	18.73	24.25	23.45	44.25
327300.00	4626200.00	27.36	18,98	23.94	23.43	44.23
326300.00	4626500.00	24.97	19.87	25.39	23.41	44,21
326700.00	4626700.00	23.23	21.86	25.10	23.40	44,20
326400.00	4626600.00	23.74	21.00	25.34	23.36	44.16
326800.00	4626300.00	26.01	19.26	24,78	23.35	44.15
326500.00	4626300.00	26,53	19.52	23.91	23.32	44.12
326600.00	4626500.00	26,31	19.03	24.60	23.31	44.11
326600.00	4626600.00	23.58	20.71	25.58	23,29	44.09
	4626400.00	27.00	19.20	23.56	23.26	44.06 44.03
	4626500.00	26.53	18,91	24.26	23.23 23.23	44.03
	4626600.00	23.48 25.96	20.31 19.33	25.89 24.33	23.23 23.21	64,01
	4626300.00 4626800.00	23.96	22.16	25.20	23.17	43.97
	4626100.00	26.56	18.39	24.47	23.14	43.94
	4626300.00	26,37	19.51	23,51	23.13	43.93
326900.00		26,02	18.74	24.53	23.10	43.90
	4626300.00	26.24	19.54	23.42	23.07	43.87
327300.00	4626800.00	21.93	22.38	24.75	23,02	43.82
326800.00	4626500.00	26.31	18.83	23.93	23.02	43.82
	4626500.00	25.72	18,86	24.40	22.99	43,79
326900.00		26.73	19.13	23.11	22.99	43,79
326800.00	4626700,00	22.91	21.77	24.26	22.98	43.78
	4626600,00	23.36	19.94	25.61	22.97	43.77
326500.00	4626600.00	23.68	20.53	24.47	22.89	43.69
327400.00	4626800.00	21,69	22.64	24,30	22.88	43.68
327100.00	4626400.00	26,88	18.90	22,72	22.83	43.63
327000.00	4626300.00	25,93	19.22	23.18	22.78	43.58
327400.00	4626100.00	26.24	18.40	23.6t	22,75	43.55
327500.00	4626800.00	21.46	22.91	23.86	22,74	43.54
	4626400.00	26.63	19.02	22.51	22,72	43.52
327200.00	4626400.00	26.77	18,81	22.51	22.70	43.50

UTM(E)	UTM (N)	2008 Concentration	2009 Concentration	2010 Concentration	3-yr Average	3-yr Average + Background
(m)	(18)	(eg/m³)	(ug/m³)	(ug/m²)	(ng/m³)	(ug/m³)
	4626300.00	25.87	19.11	23,11	22.70	43.50
	4626700.00	22.59	21.68	23.78	22.68	43.48
	4626300.00	25.88	19.01	23.03	22,64	43.44
1	4626800.00	21.21	23.08	23.42	22,57	43,37
	4626600.00	23.21	20.10	24.39	22,57	43,37
327(KX)J.(ID	4626700.00	22.30	22.04	23.31	22.55	43.35
327200.00	4626500.00	25.28	19.64	22.48	22.47	43.27
327100.00	4626500.00	25.45	19.16	22.74	22.45	43.25
327600.00	4626300.00	25,88	18,61	22.72	22.40	43.20
	4626300.00	25,48	19,39	22.31	22.40	43.20
327700.00	4626800.00	20.96	23,20	22.99	22.38	43.18
327300.00	4626400.00	26.67	18.72	21,71	22.37	43.17
327800.00	4626300.00	25.88	18.60	22,56	22,34	43.14
327700.00	4626300.00	25.87	18.51	22,64	22,34	43.14
327500.00	4626400.00	26.27	19.07	21.60	22,31	43,11
327300.00	4626500.00	25.09	19.63	22.19	22,30	43,10
	4626300.00	25.89	18.71	22.29	22.29	43.09
327400.00	4626400.00	26,51	18.69	21.66	22.28	43.08
	4626700.00	22,00	21.91	22.77	22.23	43.03
	4626500.00	23.04	20,60	22.93	22.19	42.99
	4626600.00	22.89	20,83	22.62	22.11	42.91
	4626800.00	20.73	23.01	22,58	22.11	42.91
	4626300.00	24.95	19.11	22,23	22.10	42.90
	4626660.00	22.80	21.04	22.40	22,08	42,88
	4626500.00	24.92	19.34	21.93	22,06	42,86
	46263001.00	25.57	19.09	21.42	22.03	42.83
	4626200.00	25.68	18.26	22.1[22.02	42.82
	4626200.00	25,82	18.36	21.80	21.99	42.79
327800.00	4626200.00	25.95	18,46	21.42	21.94	42.74
327900.00	4626400.00	25.35	39.06	21.36	21.92	42.72
	4626700.00	21.75	21.66	22,34	21,92	42.72
327300.00	4626660.00	22.71	20.75	22,17	21,88	42.68
	4626400.00	25.15	19.04	21.30	21,83	42,63
	4626400.00	24.93	19.02	21.23	21.73 21.67	42,53
327400,00	4626660,00	22.60 21.49	20.46 21.40	21.94 21.90	21.60	42,47 42,40
	4626760,00 4626500.00		18.76	21.90	21.58 21.58	42.38
328250.00	4626500.00 4626000.00	24,57 25,58	17.71	21.19	21.38	42.38
327500.00	4626600.00	22.50	20.18	21.71	21.46	42.26
328000.00	4626100.00	25.32	18.19	20.81	21.44	42.24
	4626500.00	24.36	18.66	21,12	21.38	42.18
	4626100.00	25.14	18.07	20.61	21.27	42,97
		21.21	21.12	21.47	21.27	-12,07
327600.00	4626600,00	22.38	19.90	21.47	21.25	42,05
327800.00	4626500,00	24.15	18.65	20.83	21.21	42.01
327900.00	4626500.00	23,96	18.65	20.57	21.06	41.86
327700.00	4626600.00	22,24	19.59	21.21	21.02	41.82
327500.00	4626700.00	20.94	20,85	21.15	20.98	41.78
327600.00	4626700.00	20,67	20.58	20.95	20.74	41.54
367000.00	1040100.00	44.41	417181	20.73	20.17	76.07

¹ Fourth Highest Maximum Daily I-la Value.

Table D-4 Consulative Analysis - 3-hr SO₂ Results

					_
	W	DTM(E)	IITM(N)	Concentration i	Concentration+Hackground
Ì	Year	(m)	(m)	(ug/m²)	(ag/m³)
1	2008	324703.80	4627195.20	62,79	78.39
Ì	2009	324703.80	4627195,20	81.48	97.08
ł	2010	324703.80	4627195.20	89.57	96,17

¹ Highest-Second Highest 3-hr Concentration

Sage Environmental Consulting, 1.9 October 2011 Sinclair Wynning Refining Company Crade Oil Optimization Project

Table D-5 Comulative Analysis - 24-br SO₇ Results

V	UTM(E)	UTM(N)	Concentration	Concentration+Background
Year	(m)	(m)	(ug/m²)	(ug/m²)
2008	324703.80	4627195.20	33,57	38.77
2009	324703.80	4627195,20	44.76	49.96
2010	324703.80	4627195.20	57.10	62,30

¹ Highest-Second Highest 24-hr Concentration

Sage Environmental Consulting, Lt^a October 2011 Sinclair Bynming Refuing Company Crask Oil Optimization Project

Table 11-6 Comulative Analysis - 24-hr PM_{2.5} Results

1/	ETAI(E)	UTAI(N)	Concentration '	Concentration+Background
Vear	(m)	(m)	(ug/m³)	(ແg/in ³)
2008	325158.90	4627182.00	5.92	14.92
2009	325158.90	4627182,06	3.99	14.99
2010	325117.60	4627184.10	3.94	12.94

¹ Highest 24-hr Concentration

Sege Environmental Consulting, 1.1° October 2011 Sinclair Wyoming Refining Company Crisile Oil Optimization Project

Table D-7 Cumulative Analysis - 1-hr CO Results

V	UTM(E)	OTM(N)	Concentration ¹
Year	(m)	(m)	(ag/m³)
2008	324723.80	4627194.90	9476.40
2009	324723.80	4627194.90	9163.72
2010	324723.80	4627194.90	12517.23

¹ Highest-Second Highest 1-hr Concentration

Table D-8 Cumulative Analysis - 8-hr CO Results

Vansi	UTM(E)	UTM(N)	Concentration l
Yens.	(m)	(m)	(ug/m³)
2008	324703.80	4627195.20	3721.89
2009	324703.80	4627195.20	4800.19
2010	324723.80	4627194.90	4109.41

¹ Highest-Second Highest 8-hr Concentration

Figure D-1

Cumulative Analysis – 1-hr NO₂ Results

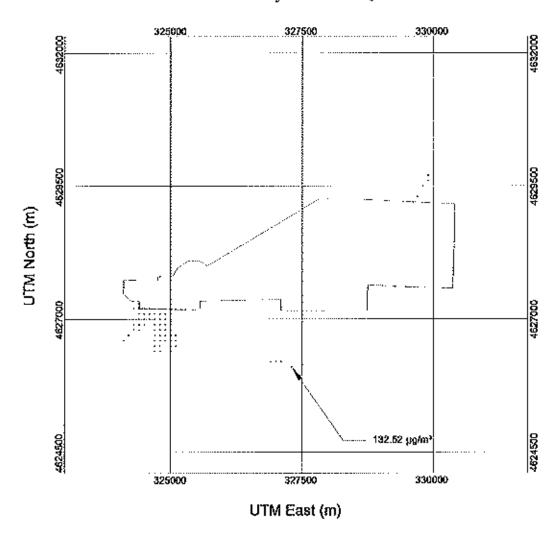


Figure D-2 Cumulative Analysis – Annual NO₂ Results

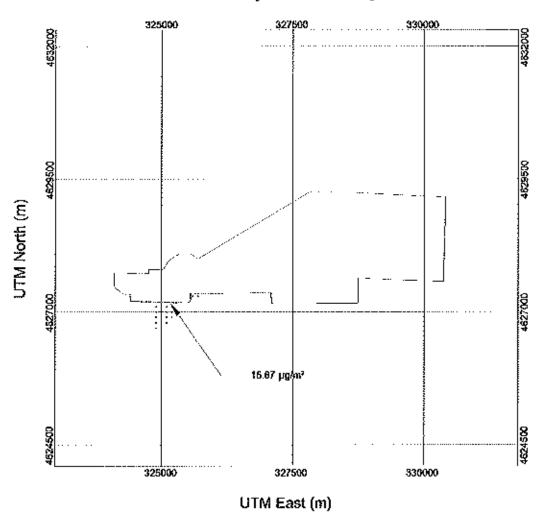


Figure D-3

Cumulative Analysis – 1-lar SO₂ Results

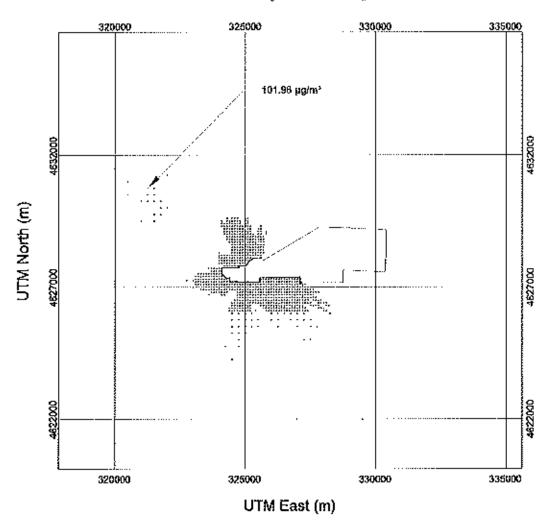


Figure D-4

Cumulative Analysis - 3-hr SO₂ Results

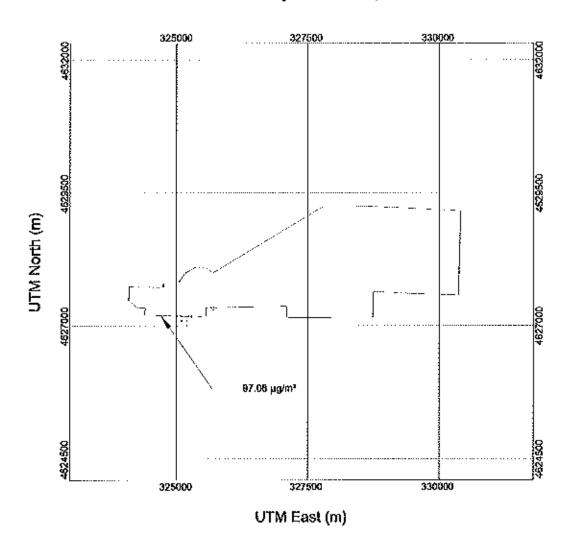


Figure D-5

Cumulative Analysis – 24-hr SO₂ Results

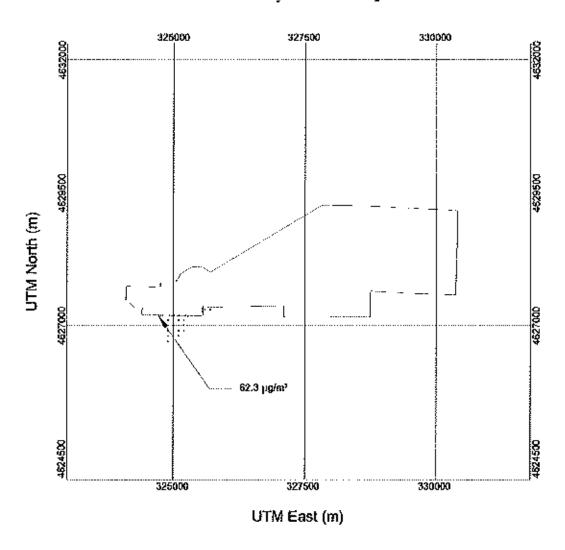


Figure D-6 Cumulative Analysis – 24-hr PM_{2.5} Results

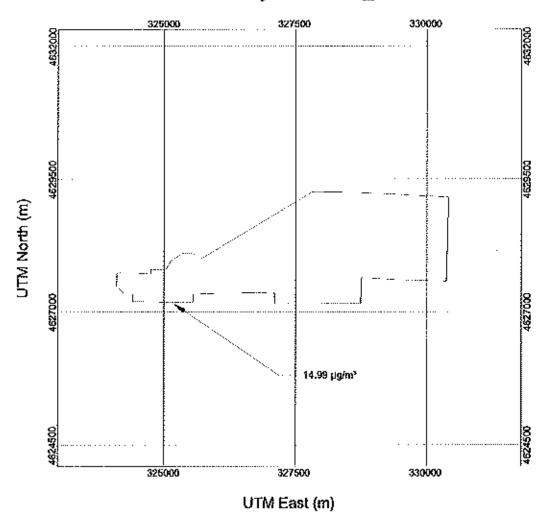


Figure D-7
Cumulative Analysis – 1-hr CO Results

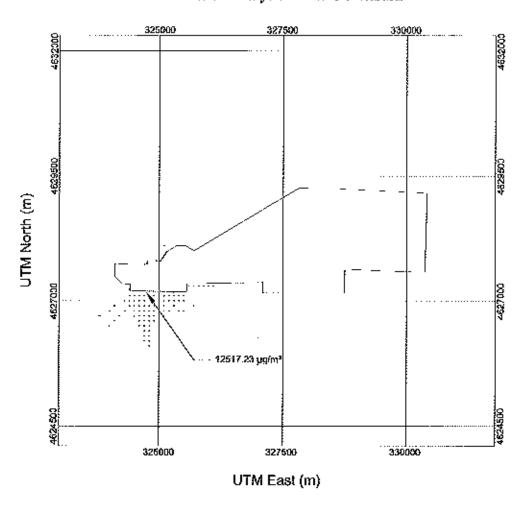
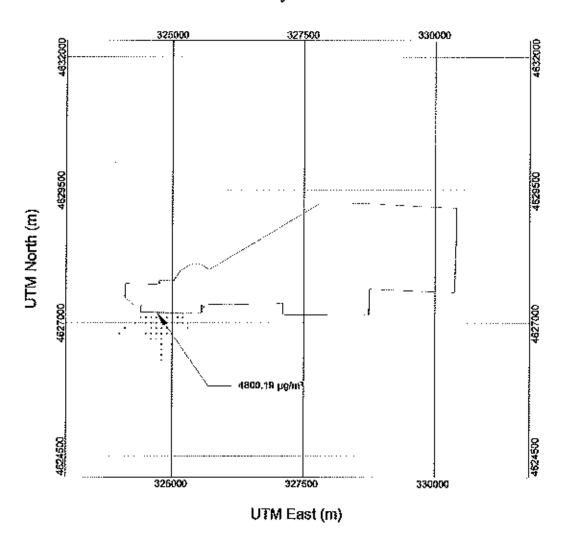


Figure D-8
Cumulative Analysis – 8-hr CO Results



APPENDIX E INHALATION RISK ANALYSIS INFORMATION

The following attachments are included in this appendix in the following order:

- Table E-1: Inhalation Risk Assessment HAP Emission Rates (g/s)
- Table E-2: Inhalation Risk Assessment Maximum Modeled Unit Emission Rates
- Table E-3: Inhalation Risk Assessment Maximum Ambient Concentration (ug/m³)
- Table E-4: Inhalation Risk Assessment Unit Risk Factors for HAPs
- Table E-5: Inhalation Risk Assessment -- Cancer Risk by Source and Total Risk

Takle E-[Iodallatina Kish Assessment - NAV Emleston Hates (g/s)

		New Sources			i		Madille	d Sources		
Polhriant	852 Houter	New Emergency Air Compensor	200 M bbi Tank	Fogitäre Emissions	281 Cloqui (lester	Se) Vecuum Heater	Coher Unit Flara	Haphtina Sobitor Heater	#ester#\$	DEHIDSAfeater
Alcenio	1 211-06	7.71X-000	- "	-	5.64E 06	1.55E-06	2.42E-06	F.124-06	1 091-06	8 Off 07
Rany Wilens	7.86F 07	5.80F 68	-		3.514-06	1066-06	1570-96	7.261-07	7.06F 0 7	5.25€-07
Cadmium	6.65L-06	5,601-08		1	3.1 0 £ 05	8.54E-06	1,335,65	6.164-06	5.981-96	4.456 06
Chicosiua	1.69F OS	5.80F 68	-		7.595-0G	2 181-06	3 991-06	1 5 N - 06	1.50E 06	1.132.06
Cobali	4.96E-07	-		-	7312.06	6.37E-07	9.926-07	4.595-07	4.491-07	3 116 02
Онрег	5.02F-06	\$.16F 07	-	-	2.346-05	6.45E-06	1 001-05	4,657-06	4.51F 06	3.33£ 06
Lead	2.966-06	5.741-07		-	1.356 05	3.84E 05	5.93E 06	2.752-06	2661-66	E 985-06
Маруилися	2.260-06	6.16(-07	-		1.045-05	Z 37E-06	4.48L-06	2.072-06	2 016:06	1,506,06
Remouny	1518-06	5.600-08	-	-	7.KAE 06	1.94E 05	3.02E 06	60-300.1	1.964-06	E.01E-06
Michel	1271-05	5,800-08.	-	-	5.92E-05	1.63E-05	2596-05	1.184-05	1.144-05	8,455 06
AnDeacena	2.84E-03	3.620.08	-	-	1.336 07	3.65E D&	5.69E 08	2.632-08	2.556-03	£ 904-08
Chrysene	9.051-09	6,63(-09)	-	-	4516:03	1246-08	1.946-08	8.964-09	8,6%(-09)	6.679 09
Ffuceanthena	1.756-03	L47E-03	-	-		3.35E DB	3.51E 68	2.52E-03	ESEE-03	1.171-08
Fluceene	1.63L-CS	5.656-04		-	7.612.03	3-10E-08	3.274-63	£.51£-08	2.4M-Q8	8.09F 08
Maphthaleea	3.63E 05	£.64£:06			1.69t-05	4 66F-06	7.26F 06	3.36E 06	3.288.06	2.41E-06
Phersonthiece	1035-07	5.692-07		-	4.798 07	1.32E-07	2.05E-07	9.525-08	9.241-08	6,912-09
Велго[в]ругело	3.45E 07	3.64£ 08	···· -		1.683-06	4.436-07	6.90F Q7	3.198 07	3.10E-Q7	2.306-07
Acetaldehedo	7.26E-0G	5.195-07]	3.38F 04	9.37E GS	2.49E-04	6.72E-05	6.526-05	4.894-05
Phosphorus	1.33€ 05	· ·			6.20405	1.716-05	2.669.66	5.23£ 05	2.26£ 05	3.692-06
Isonotano			1.844-01	0.5%(-0)	- 1		-			-
Ben (ene	1.276-66	9 869 65	E.93E 03	3.87E-08	1.33E-0V	163E-05	2511- 0 5	E.1#27-05	\$.14F 05	1.90€ 03
Formaldehete	4.482-04	2.286-05	· · · · · ·		4586.00	5.75E 04	8.99E 64	4.15£-04	4.928-01	6.4/4-09
Tobuse	200(-05	7.515 06	2.18E 03	F20£03	8.13E-0a	2568-05	1.971-95	1 654-05	1.79F 05	1. L7E 03
B@ry@enzeno	9.686.05		1.695-04	3.015-03	#0-35A\	1.34F 61	1.98F 64	8.98E 05	8.E9E-05	5.098-03
Hearane	(0%-0)		1.75£ 03	2.152.03	1.69E-05	1.40E-02	2.351-02	1,010-02	9.765-03	3.47E 06
Xylenes	1.51E 64	5.51E-06	7.43£-04	1.506-02	€./98-0/	1.146-04	3.03F 64	1.40€ 04	1.362-04	6.87£-03
Phenol	848(46)	-	-	-	1.61E-05	3.336-05	4.860-05	2.848-05	3.135-66	3.30£ 67
Acrolein	1.03E 04	1.79E 06	-		3.182-04	1326-01	3.06F-61	9.5XE C5	9.24E 0S	4.655-05
Selenium:	5.320-06	2 906-07		- :	6.208 05	6.84E-06	20-390.1	4.932-06	4.789.496	R 856-06
Cyninesa			3,698 05	L07E-03	. 1		I		-	

Sage the framework Cornel day LP October 1814 South of Figure by Refer in globary con-Control Of the international

Tubbe E-2 Inhalation Flish Assessment - Maximum Medicked Mail Engirelan Hetex

	Rew Sources				Modified Spaces					
	95i Heater	Mr Compressor	100 A4 Ebi Tank	Fægælva Evnissions	581 Cruide Héater	583 Vaçuum Hester	Coker Unit Slare	Magikilan Splinker Menter	bleater 165	#13805 lifeater
35ighest Unit Emission Rate (pg/m3 per g/sec)	1.06	61.6R	843	13.62	0.19	0.48	0.08	0.41	0.44	0.43

Raps transcensorial transcription, 14° October 2011 Stocket Hyaning Hytologic Improy-Carl Old Optimic Place Project

Table E-3
Inhalation Risk Assessment - Maximum Amblent Contentration (pg/m/)

		Haw Sources					Rodere	Sources		
Pollutera	Rii teatas	Mew 6 mergency Air Compressor	500 M bbl Yank	Fagitiva Embalána	St.I Gusta Heater	53) Vacuum Heater	Coher Guit Fizza	Naginha Splitter Heater	Heater HS	#1HD5 Heater
Arstvče	1.29F 66	4.77F C6			7.76E 06	7.43E 07	1.98E-07	4.57E-07	4.74E-07	3.455-07
Devy%um	8.37E-07	3.58L-06			1./9E-06	6.836-07	1 290-07	7.971-97	3.000-07	2,245,67
Cadmium	7.69F 04	3.59£ 06	· ·	· ·	J.52E 05	4.00E 06	1.09E-05	2.52E-06	2.61E-06	1.905.06
Chromkus	1606-06	3.58E-06			3.8GE-06	104E-06	2.1/E-0/	G.40L-07	6644-07	4.814-07
Cobe¶	5.28F Q7	·	·	· · · · · · · · · · · · · · · · · · ·	1.13E 06	3.05E 07	80 311.3	2.86E-67	1.955-07	1.422-07
Cepper	5.896-06	7.165-06			134E-05	3.03E-06	8 22 E-07	2.90L-QG	29/1-06	£.41£-06
Ecad	3.16F 06	F.076 05		-	6.76F 06	1.82E 06	4.85E 07	5.12E 06	1.16€-06	3.4EE-07
Manganeso	138E-06	7.16E-06	-		5.LOE-06	137E-06	3.6GE-07	8,466-07	8.78E-07	G.394-07
Mejouy	1.616-06	3586-06	-		3/4SF-06	4.79F 07	2.47F 07	5.77E 07	5.93E 07	4.312 07
Mickel	1.25£ (6	3.58E 06	-		2.90E-05	7.80E-05	Z.58E-05	4.80E-06	4.936-06	3.63E40G
Au/Signe; 6; 6),0 Ju,-03	2.236-06			6 (AF-)A	1.75F-06	0 65F 03	1.07E 08	1.17E 08	8.L1E-05
Chrysene	1.03£ 68	4.25€ 07			3.33E 08	5.95E·09	158E-09	3.866-09	3.50 C- 09	2.766-09
Florecitiens	E 845-00	9,596-06	-	-	4,006408	1.0AF-08	287F 03	6.63# 0/1	6 886 00	5,016 09
Fluorene	1.74E 08	3,486 05	-	-	3.77E 08	3.00E 08	267E-09	6.17£-09	6.4£E-09	4.665.09
ίδη ι ξήδοίσησ	7,847,-06	1,980-04			# 280,46	2.246-06	5.93F 07	5.579 06	1.47F 06	1.01F 06
Pikenan@wene	t.16F 07	3.5 EF 05		-	2.34E 07	6.37E 08	168E-08	3.29E-08	4.63E-03	2.935-08
Велью(а)ругела	3,675-07	2.24E-07			V.80E-07	2,320-07	5.641-08	3 000-07	1.056-07	9.810.404
Acelebiesgie	7,730,05	7.466-06	-	-	1.66F 01	4.46F 05	5.19F 05	2.74£ 05	7.45E 05	2.07E Q5
Phosphorus	5.42E-05		-	-	3.03E-05	3.19L-04	2-18L-06	5,004,06	\$.220-06	3,096,466
li nochra	-		1.556-02	1.976-01	-	-	-	-	-	-
Denzeoo	£35E-05	1_E1E-03	1.63E-02	5.20E-02	6.48E-08	7.800-06	2.08L-06	4,888,-06	498U-06	8,186-09
Foundation	4.776-01	1.410-00			3.21F-(0k	3.75F-01	7.32F 65	1,656 04	1.765 0.1	J.76E 09
Тозиено	2.13E-05	4.83E-04	1.84E-02	2C5E-01	4.00E-03	1.235-65	3.266-06	7.55E-06	7.83E-06	5.0EE-09
FilmStervens	1,090-08		1.436-03	4.090-02	3,720-08	5.950-05	8.58F-06	3.666 05	3 80F 05	4.66F O9
Herane	1.66E D2		1.48E 02	2,976-02	8.265-06	6.69E-03	£78£-63	4.126-09	4.27E-03	1.046-06
Ky)enes	1.63E-04	3.40E-04	6.26E-00	2058-01	2.340-07	9.291-05	248.40	5,726-05	5.990-05	2.936-04
Phenok	7.58E 05				7.856-07	5.49E-05	3.962-06	9.156-06	9.49E-06	9.846-08
Acceptelm	1.E0E-04	1.FDE-C4			E.664-04	G.32L-05	1,688-65	3,891-05	4.030-05	2,070-05
2eteráwa	5.67E 06	1,798 05	-		3.03£ 06	3.278-06	3.70€-07	2.01E-06	2.096-06	3.80E-06
Osmeno	1 .		3.716-04	5.404-02		· ·	1	'		

Sign Environment Committing IP Ontober 2011

North Byen highlighting timping timbeld Oyd-Paten Project

Table E-4
Inhalation Risk Assessment - Unit Risk Factors for HAPs

		Unit Risk Factor
Pollutant	CAS No.	†/(μg/m³)
Arsenic	7440-38-2	4.30E-03
Beryllium	7440-41-7	2,40E-03
Cadmium	7440-43-9	1.80E-03
Chromium	18540-29-9	1.20E-02
Coball	7440-48-4	
Copper		
Lead	7439-92-1	
Manganese	7439-96-5	
Mercury	7439-97-6	
Nickel	7440-02-0	4.80E-04
Anthracene	120-12-7	ONE
Chrysene	218-01-9	1.10E-05
Fluoranthene	206-44-0	W 2
Fluorene	86-73-7	
Naphihalene	91-20-3	3.40E-05
Phenanthrene	85-01-8	
Benzo(a)pyrene	50-32-8	1.10E-03
Acetaldehyde	75-07-0	2,20E-06
Phosphorus	7723-14-0	
Isooctane	540-84-1	
Benzene	71-43-2	7.80E-06
Formaldehyde	50-00-0	1.30E-05
Toluene	108-88-3	
Ethylbenzene	100-41-4	2.50E-06
Hexane	110-54-3	
Xylenes	1330-20-7	
Phenol	108-95-2	· · · · · · · · · · · · · · · · · · ·
Acrolein	107-02-8	
Selenium	7782-49-2	
Cumene	98-82-8	

Fable 6-5 Inhafation AUV Assessment - Cancer RUA by Source and Total Risk

	ı	lew Sources					i Şodiffed	Bources		
Politetant	BSC Heater	New Entergency Air Compressor	100 M bbt Tack	Foglithe Emissions	583 Crude Heater	583 Vacoum Heater	Coker Un& Flare	Nophthe Splitter tleater	Bester NS	BJRDS Heater
Arsenie	5 \$18-03	2.05F-B2	ND	86	1.19E 02	3.202-03	8.51E-04	1.971-03	2016-00	1.48L-03
BeryPium	20(€-03	8 59F-03	ַטִּא	ae .	4.30E 03	1.36E-03	3.09E-04	/.135-04	7.40£-04	5.39[-01
Cardenbary	1.285-02	6,44F-07	ND	NE	2.13E 02	7.36E-03	1.96E-03	4.53E-03	4.70£-03	3.421-03
C8400 Sinta	2.166-02	4.290-02	ND	SID SID	4.63F 07	2.75F 02	3.37F D3	7.686-03	7.9/E-D3	5.880.603
Tedo:7	HD	NO	ND	បាន	מא	NO.	ND	ND	MĐ	טא
Copper	no	NO	ND	NĐ	No	196	NO	ND	60	מגן
Lead	8N2	NO	מא	No	ND.	860	ND .	ND.	NB	טא
Mangacasa	aro.	NO	ND	พย	, Ņp	ИÐ	No	ND.	485	No
Mercucy	RD	No.	NO	N9	ND	No	No	מונ	NZS	ND
17:chet	6.496-03	1,720-03	ND	NZ:	1.395-02	3.75F-03	9.97F 04	7.309 03	2.39€ 03	1.74E-0J
Anthrasene	160	No	ND	NĐ	ND	He	No	ND .	NE	ND
Сњузепа	1.13L-0/	4.63L-06	OG	- GN	2/63E-07	6.545-08	1,746-08	4.075.08	4. k3F 03	3.04E 05
enneavenorT	DGD.	No	ND	N9	ND	NEs	ND	ND S	NĐ	ND
l'Iugrene	NE	ลด	ND	NO:	ND	ND	ָטא	hu	ЫD	ND
Naphihstere	2.31E-01	3.440-03	eto.	NO	2.81F-01	7.58F-0%	2/02F-05	4,662.05	4.84E 05	358-05
Phenantivene	NĐ	מא	350	ND	סמ	หอ	טא	HU .	Ne	ND
Велго(а)ругеле	4.04E-04	24/1-04	iso	NO:	8.65€-01	2 33E- 01	6.20E-05	1.436-01	E.49F-04	1,685 04
Acetaldeliydə	3./0E·04	1572-05	500	ND	3,640-01	9.816-05	2,618-05	6,015,0%	6.76F-D5	4.56E 03
Phasphorus	NØ:	ND	60	ND .	No	NE	NO	H0	NO	ИD
Isoodana	NO	ND	HO.	aN	ND	NO	ND	300	NO	ND
Зептепе	3.06E-D4	£65£-03	3.2 <u>16</u> -05	6.11C-01	5,066-07	6,09E-05	1.620-05	3,756-05	3,89E-05	6.335 03
Formaldelnyte	6.70F 03	1.83£ 02	30	NO	28/1-0/	3.570-03	9.516-04	2200-03	2,280-03	3,5% -08
Totueno	ND	RD.	क्ष	טמ	ho	No	No	86	NO	Nb
Ethylbenzena	7.5RF 04	No	3.57E D3	1.02E-01	9.311-05	1.49E-04	3.96£-05	9.150-65	9,490-05	1.178-08
Некале	מון	SAD	NG:	טמ	No l	ИD	NO	ert:	NO	MEDE
Xytenos	ND	KO	80	ND	100	ay	ans,	ND ON	NO	460-
Phopsé	ЫD	מא	ИĐ	טמ	200	Ne	ko	संध	, ND	ND.
Αργοζοίη	טוז	NO.	dB	NO	# G	ND	RD.	310	מא	NO.
Salepturg	ND	110	ak	מא	HD	ND	80	NĐ .	พบ	itts
Cumena	ND	RD	מא	Nu	HO.	ND	580	90	ND	466

	Now Sources			ModSQed-Sources						
Total MAP Carcinogenic Flick Dy Unit	#\$4 Meater	Nevr Emergency Air Compensor	100 64 b64 fank	FogStive Emissions	581 Crude Heater	583 Vecount Rester	Coher Walk Flace	Naphiha Sphiter Itemer	Heater HS	#CHDS Heater
inak by onit	5.57£ 02	5. E7E O5	1.29E-01	5.304-03	t.057 DL	3.716.07	\$.552 03	1.93E D2	2.05E/02	£32E-02

Total MAP Carcinoganic	Cancer Rick
Riek	1.05100

Stige Knowski amerik Contra Mag. 44° Dan Gre 2084 South's Rivering Reflicing Company Creds Obl Optimization Propert

APPENDIX F MODELING RESULTS FOR CLASS I AREA IMPACTS

The following attachments are included in this appendix in the following order:

- Table F-1: Class I Impact Analysis -- Annual NO₂ Results
- Table F-2: Class I Impact Analysis Annual SO₂ Results
- Table F-3: Class I Impact Analysis 24-hr SO₂ Results
- Table F-4: Class I Impact Analysis 3-hr SO₂ Results
- Table F-5: Class I Impact Analysis Annual PM₁₀ Results
- Table F-6: Class I Impact Analysis -- 24-hr PM₁₀ Results
- Table F-7: Class I Impact Analysis Annual PM_{2,5} Results
- Table F-8: Class f Impact Analysis 24-hr PM_{2.5} Results

Table F-1 Class I Impact Analysis - Annual NO₂ Results

Year	UTM(E)	UTM(N)	Concentration 1
1 CHT	(m)	(m)	(ng/m³)
2008			0.00
2009			0.00
2010			0.00

¹ Maximum Modeled Concentration.

 ${\bf Table~F-2} \\ {\bf Class~I~Impact~Analysis-Anaual~SO_2~Results}$

¥	UTM(E)	UTM(N)	Concentration!
Year	(m)	(183)	(ug/m³)
2008			0.00
2009			0,00
2010			0,00

¹ Maximum Modeled Concentration.

17	UTM(E)	UTM(N)	Concentration ¹
Year	(m)	(m)	(ng/m³)
2008	u u.	777	0.00
2009			0.00
2010	364825.87	4597107.19	0.0027

¹ Maximum Modeled Concentration.

Table F-4
Class I Impacts Analysis - 3-hr SO₂ Results

No. 11	UTM(E)	UTM(N)	Concentration!
Year	(m)	(m)	(ug/m³)
2008	311112.22	4579134.86	0.0103
2009	369444,42	4649897.46	0.0235
2010	364825,87	4597107.19	0.0435

¹ Maximum Modeled Concentration.

Table F-S Class I Impacts Analysis - Annual PM₁₀ Results

Vanu	UTM(E)	UTM(N)	Concentration 1
Year	(m)	(m)	(ug/m³)
2008		77	0.00
2009			0.00
2010		1	0.00

¹ Maximum Modeled Concentration.

Table F-6 Class I Impact Analysis - 24-hr PM 10 Results

Year	UTM(E) (m)	UTM(N)	Concentration ¹ (ug/m ³)
2008	4115.j	(81)	0.00
2009			0.00
2010			0.00

¹ Maximum Modeled Concentration.

Table F-7 Class f Impacts Analysis - Annual $PM_{2.5}$ Results

Year	UTM(E)	UTM(N)	Concentration 1
	(m)	(m)	(ug/m³)
2008			0.00
2009			0.00
2010		-1	0.00

 $^{^{1}}$ Maximum Modeled Concentration.

Table F-8 Class I Impacts Analysis - 24-hr PM_{2.5} Results

Year	UTM(E)	UTM(N)	Concentration 1
1 CAL	(m)	(m)	(ug/m³)
2008	1 1		0.00
2009			0.00
2010			0.00

¹ Maximum Modeled Concentration.